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Diseases Communicable From Animals to Man*

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THE number of diseases communicable from animals to man is so great that in the time at my disposal I can only briefly refer to each of them and point out the risks and modes of infection for the human subject. In taking a general survey such as this, I would seek to emphasize the importance of the function that the veterinarian may and can perform in the preservation of the public health.

The diseases transmissible from animals to man may be classified as: (1) bacterial diseases; and (2) diseases due to animal parasites.

1. BACTERIAL DISEASES

Included in the first class are tuberculosis, anthrax, foot-and-mouth disease, cow-pox, glanders, rabies, tetanus, actinomycosis, Mediterranean (Malta) fever, aspergillosis, ringworm. Attempts have been made from time to time to connect some diseases in cows with diphtheria and scarlet fever in man, but the evidence is not convincing.

The cow is blamed when a human source of infection cannot be traced. Of the bacterial diseases above mentioned, anthrax, foot-and-mouth disease, glanders and rabies are essentially diseases of the lower animals, and man becomes infected only from an animal source. In the other cases the animals only increase the possibilities of, and facilities for contagion, but these diseases would appear in man even without the presence of the animal factor, but perhaps not to the same extent in all cases. Let us now note some points in connection with each of these bacterial affections seriatim, and commence with the disease which calls for most serious consideration at the present time.

Tuberculosis

Tuberculosis is caused by the tubercle bacillus which was discovered by Dr. Koch in 1882. The disease is very widespread, it affects all the domesticated animals as well as man, and may even attack various wild animals during captivity. It is never found in an animal in a state of nature. The sheep and goat are practically free from the disease. In the various species of animals the bacillus is similar in its morphological characters, and the disease set up is essentially the same. The organism, however, is modified in certain ways by its environment. Certain differences have been observed in its cultural characters and in its virulence according to the animals in which it is grown, and by these differences attempts have been made to distinguish the origin of the bacilli.

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It is exceedingly difficult to ascertain to what extent the lower animals are responsible for the disease in the human subject. The progress of tuberculosis from the time of infection is usually so slow and the sources of infection so many and so frequent that seldom can human cases be pointed out with certainty as being of animal origin. I think no one doubts at this time or day the possibility of transmission of tuberculosis from the lower animals to man, but the extent to which this occurs is not yet ascertained. The present Royal Commission has found the bacilli of the bovine type in twenty-four out of 108 cases of human tuberculosis. Of these twenty-four cases, sixteen are cases of primary abdominal tuberculosis, in which the patients varied in age from one to fifteen years, in three the cervical glands were involved and only two were cases of pulmonary tuberculosis (consumption). These sixteen cases were discovered out of twenty-nine of primary abdominal tuberculosis in the human subject.

Source among young people.—In the remainder of the 108 cases the bacilli were of the human type and presumably the infection came from a human source. For twenty-two percent, therefore, of the cases of human tuberculosis examined by the Royal Commission, the lower animals might be held responsible. It is not to be supposed that I maintain this is the real proportion of animal infection, but at least it makes one realize that the danger of transmission from animals to man is a very real one. The important conclusion to be drawn from these statistics is, that the majority of the cases of human tuberculosis of bovine origin occur in young people and through the alimentary tract. This suggests that milk, forming a considerable portion of their diet, is the carrier of the disease.

Prevalence among animals.—Among the domesticated animals tuberculosis is most common in the ox, twenty-five to thirty percent of all the cows in the country are affected with the disease. One might truly say, that man and the cow are the chief propagators of the disease, and that from them most of the other species of animals contract it. The horse, the pig, the dog, and the cat are frequently infected from one or the other of these sources.

Transmission to man.—In the early stages of tuberculosis the tubercle bacilli are held up in certain lesions called tubercles in the body of the host, and during that time the animal is not dangerous to its fellows, but later on the lesions break down and the bacilli are cast off at various points from the body according to the position of the lesions, in sputum from the lungs, in the feces, in the milk, in the urine, and in discharges from the uterus. During the life of the cow the chief danger to the human subject lies in the milk. The bacilli enter the milk when the udder is tuberculous. The udder of the cow is involved in about three percent of affected animals.

Sometimes the milk contains tubercle bacilli, even though the mammary gland is for all practical purposes free from the disease. This occurs with cows showing clinical symptoms of tuberculosis. The tubercle bacilli may also enter the milk from the dust of the cow-shed raised from the dry discharges or with the dried feces on the udder or flanks. These organisms will withstand desiccation for two to three months.

Tuberculous carcasses of animals used for the food of man are probable sources of danger, but are not nearly so serious as the milk. The bacilli are contained in the diseased portions and may even be present under certain conditions in the blood-stream and in portions of the carcass, *e. g.*, in the muscles which appear quite healthy. The infected milk or flesh if partaken of in the raw state will set up the disease. The material must be exposed to a temperature of at least 185° F. for fifteen minutes in order to ensure the destruction of the organisms.

In dogs and cats tuberculosis is much more common than is generally supposed. I have seen numerous instances of the disease in these two species, and frequently the animals must have been discharging immense quantities of the microbes during life. In one recent case noted, a film from an open tuberculous lesion in the lung consisted almost entirely of a mass of tubercle

bacilli. I am of opinion that parents and guardians should exercise the greatest care before they allow their pet animals to become the friends and companions of children.

In poultry, tuberculosis is quite common, and the chief channel of infection for man from that source lies in the use of these animals for human food. As before stated, the sheep and goat are practically free from the disease.

Anthrax

Perhaps the oldest known infective disease of animals is anthrax. Its cause is *Bacillus anthracis*, noticed first by Davaine in 1850. Its causal connection with the disease was established by Koch. The organism is easily grown on artificial media, and at suitable temperatures during exposure to air it forms spores which are exceedingly resistant and may live for years in the outside world. It never forms spores in the unopened body of an anthrax-affected animal.

All the domesticated animals, with the exception of the Algerian sheep, are susceptible to this disease. Birds are very resistant. It is a very serious and deadly affection. The bacteria enter at some point of the body, chiefly through the alimentary tract in the domesticated animals, and there produce a local affection. In fatal cases the bacilli usually then pass into the blood-stream, setting up a septicemia, which ends in a few hours in death. Thus it is that these organisms cannot be found in the blood till the amimal is moribund or after death.

Among the domesticated animals, the disease is most common in the ox, but it is by no means rare in the sheep, pig and horse. The source of infection is usually contaminated food. Grazing on land where anthrax carcasses have been buried is sometimes followed by outbreaks. The anthrax spores are probably brought to the surface by worms. The ground may also be contaminated by discharges from an infected animal or from bone manure. Sometimes foreign oats and various oil cakes contain anthrax spores, and to them have been traced outbreaks of anthrax.

Transmission to man.—To the human subject the disease may be transmitted in various ways, and usually occurs in those persons handling anthrax carcasses and their products.

MALIGNANT PUSTULE is caused by the inoculation of a wound by the anthrax organism. It is a very common method of infection. In opening an anthrax carcass, the operator cuts his hand and the wound becomes contaminated. The handling of an affected carcass or portion of a carcass, *e. g.*, hides, has frequently resulted in malignant pustule. It may appear in dock laborers carrying affected hides.

BY INGESTION.—This does not appear to be a common method. Persons (and dogs) have eaten the flesh of infected animals and yet suffered no ill results. This may be due to one of two causes. The flesh contains the bacilli, seldom the spores, and the previous cooking of the food or the gastric juice may have destroyed the bacilli (but not the spores) and so prevented the onset of anthrax. At the same time, this is not an experiment which one would willingly undergo.

WOOLSORTER'S DISEASE.—In this case the wool or hair from affected carcasses is used for manufacturing purposes. Spores have formed which, as stated, are very resistant. These spores in the process of handling the wool are cast off with the dust inhaled by the workers.

Glanders

This is essentially a disease of equines and is due to a specific organism, the *Bacillus mallei*, discovered by Loeffler and Schutz in 1882. The bacillus does not form spores, and grows on suitable media in the presence of oxygen. It is easily destroyed by desiccation. The microbes are found in the lesions of the glandered horse, and the chief danger of infection arises from the nasal discharge and the discharge from the skin lesions during the life of the affected animal. Glanders occurs chiefly in the horse, ass and mule, but it may be transmitted to the cat, goat, or smaller animals, and to man. Cattle, swine, and white mice have a high degree of im-

munity. The sheep and dog are slightly susceptible.

This is a disease of large cities. Among horses the disease is transferred most commonly by ingestion of food or water containing the discharges from a previously infected horse. It may occasionally be transmitted by inhalation and inoculation of a wound. The horse, after becoming infected, may remain for a variable time, sometimes weeks or months, without showing any symptoms of the disease. In that way glanders resembles tubercle. Occasionally a horse recovers without having shown any symptoms. As a rule the course of glanders is chronic, ultimately the symptoms become exaggerated and the animal dies.

Transmission to man.—It is only when the lesions are discharging, when the farcy buds have opened or when there are ulcers on the mucous membrane of the respiratory tract, that is when the lesions are open ones, that the glandered horse becomes a serious source of danger to his fellows and to his attendants. In man the disease has been observed chiefly among horse-keepers, farriers, grooms, veterinarians, and also among investigators. In the latter case glanders has resulted from inoculation during the handling of cultures of the *B. mallei.*

In some cases transmission has been brought about by ingestion. The man may have cleaned off the nasal discharge from the horse and not washed his hands properly. He has then contaminated his food with his fingers, and his carelessness results in a very loathsome and fatal disease. Most frequently he inoculates a wound on the hands or arms or face with the infective material. Glanders, as it appears in the human subject, is usually acute and fatal, but not invariably so. The symptoms are often misleading, and the diagnosis is most commonly made at the post-mortem examination. Probably many cases are not recognized as glanders.

Foot-and-Mouth Disease

Foot-and-mouth disease affects chiefly cattle and sheep, but is transmissible also to pigs. It is due to a virus which may be made to pass through a porcelain filter. This virus is found in the vesicles on the mouth and feet, the udder and vagina, and also in the excretions and secretions, which are contaminated with the lymph from the vesicles. It invades the blood-stream also at the height of the disease. It is very contagious, but not very deadly. This virus is able to live outside the body for about three or four months. The disease is acute and lasts only about two weeks.

Transmission to man.—Most of the cases described of transmission of foot-and-mouth disease to the human subject were noted on the Continent, and resulted from partaking of unboiled milk, or its derivatives from cows suffering from the disease. According to Busemius and Siegél, 172 cases of foot-and-mouth disease occurred in man from 1886 to 1896, of which sixty-six could be traced to milk and butter. It has also been inoculated through wounds on the hands and arms. It does not appear to be contracted by eating the flesh of infected animals.

Occasionally foot-and-mouth disease has caused the death of young persons. For that reason it is very fortunate that as a rule the milk secretion of affected cows is very much decreased in amount or altogether in abeyance.

Cow-Pox

Cow-pox or *vaccinia* chiefly affects cows, but is transmissible to sheep, goats, horses and man. The cause is probably an ultravisible virus, and has a very close relationship to the virus of smallpox. The virus is confined to the lesions in a case of the disease. These lesions are observed chiefly on the udder and teats of the cow. The milkers' hands become smeared with the lymph from the vesicle, and transfer the disease to the udders of the healthy cows.

Transmission to man.—Sometimes, if the milker has a small wound on the hand, cow-pox develops on or near that position. The milk may also become contaminated from the lymph of the vesicles on the teat, and such milk, in being used for human consumption, may infect children or adults. On that account it is very necessary that no milk from affected animals should be used for the food of man.

Rabies

Rabies is an exceedingly deadly and loathsome disease. It is infective and appears chiefly in the dog and wolf. Animals susceptible are carnivora, cattle, sheep, horses, and man. The period of incubation varies very much, averaging two to six weeks, but extending up to two years. After symptoms appear, death results within a few days. Its cause is an ultra-visible virus, which is located chiefly in the central nervous system and nerve trunks of the rabid animals, and also appears in the saliva even three days before symptoms appear, and occasionally in the milk and pancreatic secretions.

Probably at some stage the organism is visible, and the Negri bodies noted in the cerebrospinal axis, especially the hippocampus, may represent such a stage. Certainly the recognition of these bodies must form a very valuable addition to the methods of diagnosis, because, unlike the experimental method, one may be able by this means to make a positive diagnosis of rabies in the dog within a few minutes, during the course of a post-mortem examination.

Transmission to man.—The disease is transmitted chiefly by the bite of a rabid dog, even a few days before showing symptoms, but also through the saliva of the dog being smeared over a wound, an abrasion of the skin, or an unabraded mucous membrane, *e. g.*, through the dog licking such a part.

Tetanus

Tetanus or lockjaw is observed most frequently in the horse, but is found also in the sheep, goat, cow, and man. The cause is the bacillus of tetanus, discovered by Nicolaris in 1885. This organism grows only in the absence of oxygen, and forms spores which develop at the end of the bacillus, swell it out, and give it the characteristic drumstick appearance. It is a common saprophyte or dirt organism, which lives and grows commonly in various soils, *e. g.*, in garden earth, and is present often in the ingesta of the alimentary tract of healthy herbivora. These microbes cause tetanus only when inoculated into a wound and accompanied by some other organisms, *e. g.*, the pus-producing bacteria. The wounds which are most commonly followed by tetanus are deep or punctured wounds, and the symptoms frequently appear when the wounds are beginning to heal up. Probably that is due to the anaerobic character of the bacillus.

The tetanus bacillus remains near the seat of inoculation, and produces a toxin which travels along the nerve trunk to the central nervous system, where it acts on the motor nerve centers. The symptoms appear a few days after inoculation, and death follows in a large number of cases.

Infection of man.—Tetanus is seldom or never transmitted from the lower animals to man. The transmission might occur if a person were to manipulate the infected wound with a hand which was the subject of cuts or abrasions, and took no precautions to wash it afterwards. The human subject becomes infected, not from the animal, but from a common source, infected ground, or utensils or instruments. A different opinion from the above used to be held. The following story is related by Kotschau. In a case of tetanus supervening in a woman after ovariotomy, this author, to explain the inoculation, went so far as to incriminate the veterinarian who was present in the capacity of a spectator. It is hardly likely that nowadays such an explanation would be accepted.

Actinomycosis

Actinomycosis or wooden tongue is due to the ray fungus or actinomyces discovered first by Bolinger in the ox in 1877. There are several varieties of these fungi (streptothrices). The actinomyces lives as an ordinary saprophyte and is met with in barley and various grains. Actinomycosis is found chiefly in the ox, but is also observed in the horse, pig, and man. In the infected animal the organisms are confined to lesions. In the ox the lesions occur most frequently about the head, various portions of the skin, and occasionally in the udder.

The disease is transmitted chiefly by inoculation. The organism enters the tis-

sues frequently through an alveolus during a change of dentition. The awns of barley or other grain may act as inoculating agents. Sometimes the grains have been discovered in the tissues at the seat of inoculation. The disease is a chronic one and the progress is slow. Sometimes the centers of the lesions break down and discharge a pus containing the ray fungi. It is difficult to ascertain to what extent the lower animals are responsible for the disease in the human subject.

Transmission to Man.—It is possible that the disease is transferred by infected milk from a diseased udder or by discharges, or by ingestion of the parts of a carcass of an ox containing the lesions. But probably a large proportion of cases of actinomycosis in the human subject results from inoculation by infected grain or from a source common to the ox.

Mediterranean (Malta) Fever

This common disease of the human subject along the shores of the Mediterranean is due to a characteristic organism, the *Micrococcus melitensis*, discovered by Colonel Bruce in 1887.

Transmission to man.—This disease has been shown to be transmitted by goat's milk, and it has even been noted that cows may also act as carriers of infection in the same way. The goats show no distinct symptoms unless badly infected, when their condition is poor and their milk watery. Amongst the troops in Malta the disease was considerably reduced by the removal of goat's milk from their dietary. It is also interesting to note that the Mediterranean fever has practically disappeared from Gibraltar since the stoppage of the importation of goats from Malta.

Aspergillosis

Aspergillosis is due to a mould-fungus, the *Aspergillus fumigatus* or *glaucus*. It affects all mammals and birds, and usually attacks those in feeble health. Sometimes it is fatal. It is frequently transmitted in the food, sometimes it is inhaled. It may cause a pneumonia which gives many of the symptoms of tuberculosis. The organism is a common saprophyte. Sometimes the disease is transmitted from the lower animals to man.

Transmission to man.—In Belgium and France it has been shown that man has contracted the disease from pigeons. In certain establishments in Paris, where pigeons are bred in large numbers, the attendants in feeding them fill their mouths with a mixture of water and food, apply their lips to the open beaks of the birds, and inject a portion of the mixture into the birds' crops. In that way the men become affected with aspergillosis, from which some of the birds may be suffering.

Mould Infestations

Ringworm is a skin disease, due to certain varieties of moulds. The number of these moulds is exceedingly great.

They are chiefly differentiated by the character of the cultures. They form branching threads with various fruit bodies and spores. They live outside the body for many months. On the body they grow on the epidermis, penetrate the hairs, and cause thickening of the epidermis and loss of hair. (Its more common forms are *Microsporon*, *Trichophyton*, *Oosporon* and *Achorion*.) Ringworm is found in all the domesticated animals, most frequently in the ox, horse, dog, and cat.

Transmission to man.—Ringworm is easily transferred by contact with affected patches, or through grooming utensils, litter, harness, etc. The clipping machine used for the horse or ox and man has been the means of carrying the disease. Favus, a form of ringworm, has been frequently transmitted by the rat and mouse to the cat. It then affects commonly the head and limbs.

Children sometimes contract the disease by playing with the affected cat. The disease thus appears frequently on the hands, arms, and face. Contact with the diseased patch on the skin of the calf may cause the appearance of ringworm on the back of the neck of the butcher from carrying the animal. I am not to be taken from the above as stating that all the cases of ringworm in man are of animal origin, but only that some cases are so transferred.

II. Animal Parasitisms

Included in this class are mange or scabies, beef measles, pork measles, echinococcosis and trichinosis.

Scabies

Each species of animals is provided with separate varieties of acari causing mange or scabies. Occasionally the mange acari of horse and dog (*Sarcoptes*) pass on to the hands, arms, and breast of man, and cause very great irritation. This irritation, however, as a rule lasts only a few days, the acari leave their host and the man recovers spontaneously.

Tapeworm Infestation

The ox is sometimes the host of the cystic stage (*Cysticercus bovis*) of the unarmed tapeworm of man (*Tænia inermis*). It picks up the eggs of the tapeworm with the grass. These eggs have been voided in the feces of man. Six-hooked larvæ develop from the eggs and penetrated the bowel wall, and pass to their predilection seats in the muscles, especially the muscles of mastication, where they develop into small bladder-worms (*beef measles*). These bladder-worms are no larger than split peas, and they may live in the body of the bovine for some time. If the ox is slaughtered for human food, then the infected muscles, if eaten, uncooked or imperfectly cooked, liberate the bladder-worms, which develop into the unarmed tapeworms in the intestines of man.

In a similar way the pig becomes the subject of the cystic stage (*Cysticercus cellulosæ*) of the armed tapeworm of man, the *Tænia solium*. The bladder-worm, at most about the size of the pea, invades the muscular portions of the body, especially the tongue and heart (*pork measles*). Sometimes the parasites may be detected during the life of the pig by examination of the tongue. The carcass of the pig, if eaten uncooked or imperfectly prepared, liberates the bladder-worms, which develop within the intestines into adult tapeworms.

Large echinococcus cysts develop in various organs and tissues of the herbivora, pig, and man. They may attain the size of an orange or apple and destroy the normal structure by pressure. They are the cystic or bladder-worm stage of a tapeworm of the dog (*Tænia echinococcus*). For human infection the eggs of the tapeworm voided by the dog must become attached to the food of man, or contaminate the drinking-water and develop in man into the bladder-worms (*echinococcosis*). The cysts do not appear to be at all rare in the human subject.

Trichinosis

A small round worm, the *Trichinella spiralis*, is often found in the rat, the pig, and man. The condition is known as trichinosis. The immature worm is devoured by a susceptible host often in large numbers in infected flesh. In the intestines it is liberated, becomes adult, and after fecundation the female gives rise to as many as 1,500 young. These larvæ enter the lymph and blood-stream through the intestinal wall, and pass to the muscular tissues of the body. Especially are they found in the pillars of the diaphragm, tongue, intercostal muscles and tail. They enter the muscular fibres, become encysted, and remain in that position during the remainder of the life of the host, where they may live for several years. The encysted parasites are so small that their presence can be detected only by the use of the microscope. The disease is commonly propagated by rats. The pig becomes infected by eating rats or the offal of trichinous pigs and man contracts the disease by eating the uncooked or imperfectly prepared flesh of trichinous pigs. When the infection is a very large one, the condition set up during the migration of the immature worms to the muscles is very serious, and sometimes fatal.

Less Common Parasitisms

There are a few other animal parasites which occur occasionally in man, and are common parasites of the lower animals, *e. g.*, the liver fluke, but I have no time to refer to them. The list I have given is a fairly formidable one, and what I have said is sufficient to show the need for supervision of the lower animals, in the interests of public health.

PREVENTION

To prevent the transmission of diseases communicable from the lower animals to man, it is necessary to guard the routes of infection. The most effective measure consists in the extermination of these diseases in the lower animals. This has been done with certain diseases and is quite practicable with others still remaining to be dealt with.

Rabies has been eradicated from the British Isles. There has been no outbreak amongst the lower animals since 1903. Foot-and-mouth disease is now only occasionally introduced from the Continent by various carriers such as foodstuffs. Glanders is fast disappearing from the equine population of the British Isles. There are practically no cases of it in Ireland, and last week only three outbreaks were notified in Great Britain where formerly thirty or forty occurred.

In the case of tuberculosis, although the danger of infection from the lower animals to man appears to be a very serious one, no uniform effort has been made to control the disease. The inspection of meat and milk is not yet sufficiently uniform to guard the public health. But it may be said that to get rid of all danger of animal infection entirely, the most effective means would be the eradication of tuberculosis from the lower animals, and especially bovine tuberculosis. What has been done with rabies, and is being done with glanders, can also be effected with bovine tuberculosis.

With those animal diseases due to sporulating organisms or organisms due to facultative parasites, all that may be effected is to control them and prevent by careful diagnosis and meat inspection the infection of the human subject. Anthrax of the lower animals is likely to remain with us. With the measures adopted for the disease appearing in this country no outbreak should appear in man, but with wool, hair, hides, and offal coming from abroad, sufficient supervision is not given to prevent anthrax inoculations taking place.

For other animal diseases due to organisms or animal parasites, transferred to the human subject by ingestion, the systematic control of diseased animals, and efficient meat and dairy inspection, carried on by skilled veterinarians, and the proper preparation of the food for human consumption, are the only true safeguards.

In conclusion, I think I have shown how necessary the veterinarian is to the community in preventing the transmission of diseases communicable from animals to man, and I have only to add that the measures adopted in the British Isles for this purpose are wholly inadequate, and call for immediate attention, considerable addition, and revision.

Treatment of Wounds*

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II

1. Measures should be adopted which are likely to ensure the healing of wounds in as short a time as possible, so that the animal can return to work.

2. Steps should be taken to prevent serious complications such as septicemia, pyemia, malignant edema, erysipelas, bacillary necrosis, tetanus, etc.

3. Measures for the prevention of permanent blemishes are of importance, and in the case of wounds affecting the limbs, every effort should be made to avoid the occurrence of conditions likely to interfere with the working powers of the animal.

Human and Veterinary Surgery Contrasted

Here it will be necessary to compare human surgery and veterinary surgery as regards the treatment of wounds, both

*Continued from page 180, AMERICAN JOURNAL OF VETERINARY MEDICINE for May, 1912.

accidental and as the result of operations. The distinguishing features that stand out preeminently are the following: The human surgeon has the advantage of a well-equipped hospital with all modern conveniences, and a staff of trained nurses to carry out his instructions. He is supplied with every detail calculated to ensure surgical cleanliness, and to exert a favorable influence on the course of wounds. Moreover, in operation wounds, aseptic principles are carried out from start to finish by trained hands, and the patients contribute to favorable results by obeying the instructions of the surgeon. By complete rest the healing of wounds is facilitated, and means can be adopted by which the affected part is rendered as free from movement as possible.

In the case of accidental wounds, early treatment is carried out before sepsis has had time to exert its effects, even though microorganisms have gained an entrance.

The veterinary surgeon on the other hand, has the most adverse circumstances to contend with in his endeavors to render wounds, whether surgical or accidental, aseptic, and to keep them in this condition. Even in the best equipped veterinary infirmaries, so far as horses are concerned, it is extremely difficult to carry out aseptic surgery. No doubt by the use of iodine it is now possible to sterilize the skin, but there are other points to be considered. [Equine operating tables, which because of the nearly perfect control of the patient contribute much to aseptic surgery, are not in common use in veterinary infirmaries in Great Britain as they are in the United States.—Ed.]

Given an operating table, and a trained staff of assistants, so that the operator is only concerned with the operation, also that the operator or his assistants will carry out the subsequent dressings of the wound, then indeed aseptic surgery and healing by first intention, are possible, provided the technic is carried out so that the entry of microorganisms is prevented.

Hindrances to Aseptic Surgery

But in ordinary practice a very different state of affairs exists; the patient is cast on a bed of straw, skilled assistants are not at hand, so that the operator has to attend to the casting, securing, and so forth, of the animal, by which means his hands become contaminated, and even the best directed attempts at asepsis are likely to be frustrated by the clumsy actions of the assistants. Then again, unless the practitioner is able to carry out the after treatment of the case, his primary endeavors will fail, as contamination of the wound is certain to occur.

With reference to accidental wounds, it is quite apparent that they become infected prior to professional assistance being sought. Contamination occurs at the time the injury is inflicted, and also from the treatment adopted by the owner or attendant.

Consider also the surroundings in which horses are placed; even with the most scrupulous care and attention, it is impossible to render the best planned stall free from microorganisms, and every act of the attendant seems calculated to secure infection of the wound. As for the average stable, both in town and country, and the crude methods of treatment adopted by the owners of animals, the wonder is that serious or fatal sequelæ are not more common. For not only is the stall a veritable breeding ground for microorganisms, but also everything brought into contact with the wound is teeming with germs. Hands begrimed with dirt, filthy sponges, dirty stable buckets, soiled bandages, etc., are much in evidence, even the water for performing the perfunctory cleansing of the wound is anything but pure. How then do wounds heal under such circumstances? I think you will agree that the explanation is to be found in the natural powers of resistance possessed by the horse. If this vital resistance to the action of microorganisms did not exist, we should meet with far more cases of septicemia, pyemia, etc., than we do at present.

No doubt of late years it is not unusual to find disinfectants in the hands of many owners of animals, and these agents are applied in concentrated solutions to wounds, with a total disregard for ordinary cleanliness. The result is that instead of pro-

moting healing they retard it, as they exert a caustic and irritant action on the tissues, besides the deeper portions of the wounds are not cleansed and abound in micro-organisms.

A similar error is committed with reference to the disinfection of stable floors, the dirty surface is allowed to remain while disinfectants are scattered thereon.

Then again while wounds are being dressed, it is not uncommon to find the dressings laid on the stable floor for convenience and exposed to contamination from several sources.

Varieties of Wound Infection

It will now be of advantage to consider as briefly as possible the measures that can be adopted in order to fulfil the indications I have mentioned. In order to fully grasp the importance of attention to surgical cleanliness and the judicious employment of antiseptics in the treatment of wounds, it will be necessary to consider the *microorganisms of wounds*, the *modes of infection*, and the means by which these can be overcome.

With reference to microorganisms, the most important are the *pyogenic cocci*; these include the following staphylococci and streptococci:

Staphylococcus pyogenes aureus is found in acute abscesses and is responsible for the majority of suppurative inflammation, it is occasionally present in general pyemia, and is often associated with other pyogenic organisms in suppurative processes. It is very resistant to many antiseptics, but is readily destroyed by solutions of the more powerful germicides; it is very widely distributed and is found abundantly in the superficial layers of the skin of animals and frequently beneath the fingernails in man. Experiments have demonstrated its power of producing suppuration, both locally and internally, and it has been shown that if the vitality of the parts experimented on has been previously lowered, or the tissues damaged by chemical or mechanical means, infection occurs more certainly and readily.

Staphylococcus pyogenes albus is similar to but far less virulent in its action than S. aureus.

Staphylococcus pyogenes, citreus is found only in abscesses.

Streptococcus pyogenes is another very important organism. It is the causal agent in spreading cellular inflammation, and of pyemia and septicemia in many instances; also of septic metritis, and ulcerative endocarditis. One of its peculiarities is its tendency to invade the lymphatics and to induce lymphangitis and cellulitis; another is its capability of producing acute suppuration, sloughing of the tissues and inflammatory wound-gangrene. Probably there are many varieties of streptococci, but their characters resemble each other so closely that it has not been possible to isolate them. Thus the *S. erysipelatis*, the causal agent of erysipelas, resembles so closely both in appearance and cultural characters, the S. pyogenes, that many authorities regard them as identical. The effects produced, however, are rather distinctive and the S. erysipelatis must be regarded as an organism of serious importance in connection with the treatment of wounds.

The powers of resistance of streptococci must be regarded as feeble when compared with those of staphylococci.

Bacilli of importance in connection with wound infection, are: the *tetanus bacillus*, the *bacillus of necrosis*,[B. necrophorus] the *bacillus of malignant edema*, and the *bacillus coli communis*. Occasionally the *bacillus tuberculosis*, and the *bacillus* [Pseudomonas] *pyocyaneus*, may infect wounds. Amongst other causal agents in wound infection we may mention the *botryomyces* and the *actinomyces*, also the Streptococcus equi, the causative factor in strangles or colt distemper.

With such a formidable list of micro-organisms before us, it is apparent that the most important part of our duties in connection with the treatment of wounds, is to prevent the entrance of these microbes as far as is possible, or failing in this, to destroy their vitality or retard or prevent their development.

The following modes of infection merit consideration:

1. Infection by air.—Aerial infection was recognized even in prescientific periods.

The Listerian principles and the carbolic spray were directed against this mode of infection, and the air was regarded as containing the germs of putrefaction, which were capable of setting up septic processes in wounds and their secretions. This view has been considerably modified in the present day. Experiments have demonstrated that the greater number of bacteria present in the air are non-pathogenic, that germs exist in the atmosphere only in the form of dry dust, that air perfectly freed from dust is harmless to wounds, and when the air is kept still, wound infection rarely takes place through the atmosphere. But practically speaking, we must admit the possibility of infection by air containing dust, when we consider the surroundings of horses, the dust raised from a straw bed and during the process of cleaning the stall. Indeed some observers state, that they have found cocci closely related to the pyogenic varieties and sometimes actually belonging to that class, in atmosphere dust, especially where the air is moist.

2. *Infection by water* occurs unless this fluid is sterilized by boiling or a germicide added thereto. Ordinary water contains a large number of bacteria, usually many hundred thousand per Cc.

3. *Miscellaneous sources.* Other modes of infection include, infection from the skin of the patient, from the hands of the surgeon or those of his assistants, from instruments, sponges or their substitutes, ligatures and sutures, dressing materials, vessels or utensils, syringes, etc.

Circumstances Predisposing to Infection

Among the factors which render a given infection more likely to prove harmful we may mention, excessive injury to the tissues during an operation, such as rough manipulation, bruising or tearing of the structures, by such means their vitality is lowered and their resistance is impaired so that the development of microorganisms which may have gained entrance is thereby favored. The number and virulence of the infecting organisms, the state of health of the animal and the environment, are also important in connection with this subject.

Wound Healing

Time will not permit me to enter into the question of the repair of wounds. As you are well aware, the modes of healing are as follows:

1. *Primary Union* or "union by first intention." This takes place in simple incised wounds under favorable conditions, i. e., when there is a practical freedom from infection, when hemorrhage has been arrested, and the surfaces are brought into apposition, and kept at rest. It is the mode of healing we all srtive to bring about, but so seldom succeed in attaining so far as the horse is concerned.

2. *Union by Granulation and Cicatrization.*—This is by far the more common method of healing in horses. Formerly there was an idea that the suppuration accompanying the process originated from the superficial layer of cells on the recent granulations, which were arrested in their development and converted into pus cells, being cast off in the discharge. We know now that the cause of the suppuration is the presence of microorganisms, and that union by granulation can occur without suppuration, although admitting that such is not common in the horse. [The reader will bear in mind the author is describing conditions as they exist in Great Britain. In the better American veterinary hospitals the surgeon feels he has been very careless in his work if *any* operative wounds in healthy tissue develop suppuration.—EDITOR.]

3. *Union under a Scab.*—In this, repair takes place beneath a scab formed by the drying of the discharges. This is cast off spontaneously as soon as cicatrization is completed underneath. It is a common mode of repair in wounds left to heal without any dressing.

The Technic of Treatment

We now arrive at the practical application of the principles, based on a consideration of the points we have considered. Dealing first with operation wounds, in the case of healthy tissues in the normal animal, there are certain details which, if they do not result in bringing about healing by first intention, will at any rate assist

in the process of repair, and prevent the occurrence of serious sequelæ.

I suppose everyone will agree that instruments are best sterilized by boiling for five minutes in water containing a teaspoonful of carbonate of soda to each pint. The addition of the soda raises the boiling point of water to 104° C., and besides it prevents the formation of rust if the instruments are left in the solution for some time; when required for use they are placed in a sterilized tray containing a solution of carbolic acid one to forty. The water should be boiling before the instruments are placed therein, and the vessel in which they are boiled should have a closely fitting lid so that the water will boil at a uniform temperature. As regards sharp instruments, such as knives, scissors and needles, which become blunt from the effects of boiling, some surgeons advise that the edges be protected with a piece of gauze or lint and state that blunting does not then occur. This is not my experience, and I prefer to immerse such instruments in undiluted carbolic acid for a short time, and then place them in a carbolic solution, one to twenty. This method is advised by Sir Watson Cheyne, and it is also valuable in case an instrument happens to fall on the ground during an operation and is immediately required, as boiling takes five minutes to sterilize. Indeed this method is also useful in emergency operations, when facilities for boiling are not at hand, or an instrument is required for use at a moment's notice. Corrosive sublimate has a most destructive effect on metallic instruments, hence solutions of this agent are unsuitable for sterilization purposes.

As regards the preparation of the patient's skin and the hands of the surgeon, it is not feasible to carry out that tedious technic of sterilization adopted by human surgeons. Fortunately we have in tincture of iodine an agent which renders the skin of the patient and the hands of the operator aseptic. Of course the operation area should first be shaved before the iodine is applied. Two applications are necessary, viz., one about fifteen minutes prior to operation and the other immediately before operation. Simple incised wounds are those which are most likely to heal by first intention, provided certain details receive attention.

Primary Union Seldom Secured

Deeper wounds as already remarked, generally heal by granulation, but unfortunately in too many instances suppuration occurs in spite of all precaution. But there are degrees of infection depending on the number, character and virulence of the infecting microorganisms that gain entrance to the wound; hence the necessity for surgical cleanliness and the judicious employment of antiseptics.

There are two important points in connection with the subject which cannot be ignored. The first is, that in operations of all kinds the tissues should receive as little damage as possible. Neatness and dexterity in operating exert a marked influence on the healing of the resulting wounds. This is well exemplified in the operation of neurectomy, a skilful operator exposes the nerve and excises the desired portion with little or no damage to the surrounding tissues. On the other hand an inexpert operator in his efforts to expose the nerve, disorganizes the tissues to a considerable extent. In the former case the wound heals by first intention, in the latter, even with all attempts at asepsis and antisepsis, healing occurs by granulation often accompanied by suppuration.

The next point is with reference to drainage. Now in all wounds of any extent, an exudation of serum occurs, this is generally referred to as the "secretions of the wound." Such must not be allowed to accumulate in spaces in the wound, and proper drainage is necessary. Accumulations of serum not only cause tension in the wound, but also favor the growth of microorganisms

The various details in connection with aseptic wounds need not occupy us further. For the reasons already given it is very difficult to obtain healing by first intention in the case of horses; that it is possible even in the major operations has been demonstrated by operators who have had special opportunities for carrying out the technic. But I have yet to learn that aseptic surgery

as conducted by human surgeons, can be carried out in the ordinary operation by the general practitioner. Take even the latest surgical feat, viz., the new operation for "roaring," where aseptic precautions are rigidly carried out before and during the operation, and what is the result? Certainly not healing by first intention in any instance, and more often than otherwise the wound is septic and frequently fetid. Such a condition would be regarded as anything but creditable in human laryngeal surgery—but then the circumstances are different.

There are some enthusiasts who give details of aseptic methods of castration; needless to remark they do not operate on many colts and have very little idea of the conditions and environment of these animals in the country. My experience in the attempt I made at aseptic castration carried out by means of ligature, was that no suppuration or swelling occurred but the animal died of septicemia and septic peritonitis. Had suppuration and swelling occurred probably the case would not have succumbed. At the same time I believe in all possible attention to surgical cleanliness and to antisepsis, during the operation of castration although I know full well that these measures will be frustrated in their results by the owner or attendant of the animal. How infection occurs in castration wounds is so obvious that I need not refer to the subject.

Treatment of Accidental Wounds

When operation wounds suppurate or become septic, they are in the same category as accidental wounds so far as treatment is concerned.

Every accidental wound may be assumed to be infected, to a greater or less extent.

In carrying out treatment, there are certain important procedures necessary, which I shall refer to under the following headings.

1. Arrest of hemorrhage, if present. This constitutes a subject sufficient in itself for a paper and will not be considered here.

2. Cleansing and Disinfecting of the wound. This latter is carried out by careful washing out with an antiseptic solution. As to the agent selected it is largely a question of choice. The large number of reliable germicides that are now on the market render a selection comparatively easy. Carbolic acid is still largely employed for the purpose, although there is considerable difference of opinion as regards its germicidal power. Whatever agent is used, a thorough cleansing of the wound is essential.

Unfortunately we do not often get the chance of the first dressing of a wound, as the owner or the attendant attempts the process on the occurrence of the accident and far too frequently introduces infection. In the case of a deep punctured wound, in which infection is probably deep-seated, and the external opening small in size, it is necessary to carefully enlarge the latter so as to carry out thorough irrigation.

3. Removal of Foreign Bodies. This is a procedure that requires special attention. Wounds in hunters frequently contain foreign bodies such as thorns, portions of gravel, etc., and a careful search is necessary in order to discover their presence; if they are overlooked serious trouble will occur afterwards.

4. Drainage. Efficient drainage is of the greatest importance. This is well exemplified in the progress made in punctured wounds extending in an upward direction, and in those extending downwards. Without proper drainage, all other means will fail. To carry this out efficiently in the case of extensive wounds is not always an easy matter, but on it depends success or failure. Suitable openings must be made at dependent parts, and the selection of drainage materials will depend on circumstances. If gauze drainage be employed care should be taken that the gauze does not act as a plug and prevent the escape of discharge. In extensive wounds india-rubber drainage tubes are to be preferred. The old-fashioned seton must be condemned as it causes irritation and increases suppuration.

5. Sutures. Careful consideration is necessary in order to decide as to the advisability of employing sutures or otherwise. The frequency with which extensive wounds, involving the muscular tissues,

(such as occur in the region of the hip) suppurate, and the sutures give way has led some practitioners to leave such wounds open. No doubt in the case of a "squealing" kicking mare, or of an unbroken colt, we all have a tendency at times to avoid the use of sutures, and it is surprising to find how readily such wounds heal. Still there is no doubt but that less blemish is left if the edges of such wounds are brought together by sutures at any rate for a time, provided thorough cleansing is carried out and proper drainage is provided. In extensive wounds of this kind occurring in vicious animals, I always cast them in order to carry out the procedure properly. The suture material should be soft in texture, but strong; hard material is very likely to cut through the skin. In clean-cut wounds, sutures should always be employed. It is hardly necessary to remark that in punctured wounds, or deep wounds of any kind, and in the case of torn or lacerated wounds with much destruction of tissue, or in suppurating or septic wounds sutures are contraindicated.

Experience has taught me that wounds in the region of the head are best treated without sutures, unless such cases are in an infirmary under the immediate care of the practitioner, so that the early indications of septic infection may be observed. Under other conditions there is a tendency to the occurrence of erysipelas or allied complications. I now paint such wounds with tincture of iodine and find the best results therefrom. This may be considered as an irritating agent, but the results justify its employment. There are instances of suppurating wounds in which suturing should be attempted in order to avoid permanent blemish. Some time ago I saw a case in a foal in which a wound extended from the commissure of the lips up the cheek, exposing the first two molar teeth. The accident had occurred about ten days previously, and two attempts at suturing had been made, but they were unsuccessful. The wound was suppurating freely and granulations had formed on each of the edges, but there were no evidences of union. My first attempt was also unsuccessful. I then cast the animal again, removed all granulations with a sharp scissors, freshened the edges of the skin and mucous membrane, removed all debris of food, washed the parts thoroughly with peroxide of hydrogen, inserted a deep layer of sutures so as to bring the edges of the mucous membrane together, the sutures being composed of soft silk, soaked in peroxide of hydrogen, a superficial row of sutures were inserted in the skin, the wound was again cleansed with the antiseptic and then painted over with collodion. The foal was removed from the dam and fed from a pail, and no further dressings ordered except the application of compound tincture of benzoin to the edges of the wound after a few days. A few of the sutures gave way, but healing progressed satisfactorily and perfect union resulted.

6. Surgical Dressings. As a general rule wounds should be covered with suitable surgical dressings, whenever possible, at any rate in the earlier stages. Whether these dressings should be moist or dry must depend on circumstances. In suppurating wounds, I find the best dressing, in cases where expense is no object, is double cyanide gauze soaked in solution of peroxide of hydrogen one part of the ten volume solution to three of water), the gauze is then enveloped with a thick layer of cotton wool and a bandage.

As to the frequency of dressing, this will depend on the amount of discharge, when the latter soaks through the dressing, it is an indication for renewal. If this be neglected the discharges become putrid and a mixed infection is likely to occur.

For country practice a reliable and cheap antiseptic is Huxley's Liquor Cresolis, in two percent solution.

As the discharge lessens, the dressing need not be changed sooner than the third day, and later on a dry antiseptic dressing may take the place of the moist one, such as boric acid with zinc oxide.

In punctured wounds, after drainage has been provided for, I find it is a good plan to plug the wound with gauze soaked in peroxide of hydrogen; this is renewed as often as circumstances require.

In country practice it is useless to expect the owner or attendant to apply dressings properly, hence unless there are reasons to

the contrary wounds do best when left open, and simply cleansed with an antiseptic solution and painted with compound tincture of benzoin. This latter agent fell into disuse for some time, but in my experience it is a most useful wound dressing for country cases, where as little handling as possible of the wound is an important matter.

Carbolized oil, which at one time was so popular a dressing, is now known to be absolutely inert as a germicide.

In hunters, deep puncture wounds of the front of the hind fetlock due to sharp stones are of very frequent occurrence. The bursa of the tendon may, or may not, be opened, but acute inflammation rapidly develops and marked pain is present. Attempts to heal such wounds quickly, do not prove successful, as infection is deeply situated; in my experience the best dressing is one of the modern substitutes for poultices, which are composed of kaolin, glycerin, and antiseptic agents, applied hot and changed daily. When acute symptoms have subsided, the ordinary dressings may be applied.

Wounds of the sheaths of the flexor tendons are often serious in consequence of the infection extending upwards and downwards. Free drainage should be provided early, and rigid attention to antisepsis is necessary.

In all wounds in the region of the limbs, there is a tendency to the formation of exuberant granulations and these require early attention in order to avoid permanent blemishes from resulting. I find that the judicious application of finely powdered sulphate of copper is the most reliable treatment in these cases, old-fashioned no doubt, but efficient for the purpose required.

Wounds of the knee involving the extensor tendons in the vicinity of this joint are not uncommonly followed by fibrous anchylosis, accelerated no doubt by keeping the horse from lying down. When such a complication occurs, the animal should be cast and chloroformed and the joint forcibly flexed, otherwise the horse will be useless.

Wounds in the feet due to picked-up nails, I shall not consider, as such would form a separate subject for a paper. But in hunters, wounds are not uncommon in this region as the result of portions of furze (gorse) branches entering the foot in the vicinity of the frog. Sharp portions of flint not uncommonly enter the foot and extend deeply into the sole. The detection of such foreign bodies is not always an easy matter and requires a careful examination of the foot. I believe the best treatment after the removal of the foreign body and the proper enlargement of the wound, is to apply pure carbolic acid or lysol, and a cataplasm composed of kaolin and glycerine.

In my experience the most dangerous class of wounds are those due to punctures from shafts, such as result from collisions. The difficulty in obtaining drainage is very considerable, especially when the wound occurs in the region of the hind quarter. But proper drainage must be secured at all costs, otherwise treatment will fail and septicemia will result. If necessary the animal should be cast in order to carry out the surgical procedure; after treatment will consist in copious irrigation with antiseptic solutions carried out by means of a Wintons syringe provided with a gum-elastic top. Where expense is not objected to, the wound should be plugged with double cyanide gauze soaked in hydrogen peroxide solution, the irrigation and dressing being carried out daily.

Time will not permit me to deal with the question of open joints, which in reality would require a special paper. But I cannot omit drawing attention to the dangerous character of punctured wounds in the forearm, which are not uncommonly followed by purulent arthritis of the elbow joint. The septic inflammation extends along the sheaths of the tendons, and as you are aware these tendons support directly the synovial membrane of the elbow joint. Hence wounds of this region should be drained as early as possible by a free dependent opening.

Conclusion

There are many other practical points deserving of notice in connection with the treatment of wounds, but the paper has already exceeded the extent of what I intended, and I fear also that it has over-

taxed your patience. The practical outcome of a consideration of the subject appears to be that, although we can never hope to practice aseptic surgery in the strict sense of the term, we can at least carry out antiseptic principles, as far as is possible under the very unfavorable conditions that surround us.

Improvements in the results obtained are more likely to follow strict attention to surgical cleanliness and proper drainage of wounds, than to care in the selection of the agents we employ as drainings. After twenty-five years of "playing the game," and seeing it played by others, I cannot believe that amongst the host of agents that are introduced yearly, one possesses any special virtues over another so far as the healing of wounds is concerned.

In conclusion, I think the practical deduction to be drawn is, that every attempt should be made to exclude infection from wounds, whenever this is possible, and, in the case of wounds already infected, to retard the growth and development of microorganisms by the judicious employment of antiseptics.

But whether in the case of operation or of accidental wounds, it is quite apparent that in ordinary practice we cannot dispense with antiseptics and attempts to do so are likely to be followed by disaster.

The Embryologic Explanation of Some Common Malformations*

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CONGENITAL malformations are of interest to three classes of veterinarians. First, to the obstetrician whose work is often made more arduous, because of the difficulty of delivering a malformed fetus; second, to the general surgeon, because of the opportunity often presented for correcting developmental defects; and third, to the investigator, who seeks to know why such perversions of structure have occurred.

When we stop to consider that within the confines of a microscopic sperm or egg cell are held the influences which control the development of a new being, and that this control is manifested not only in adherence of the new animal to the type which characterizes his species, but that there is also a true reproduction of the parental characteristics, such as color, markings, disposition and a hundred other individual qualities, the wonder is that developmental defects are not more common than they are.

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Effect of Germinal and External Influences on Embryonic Development

Many attempts have been made to discover what influences are responsible for perverted development of the young from the fertilized egg, some workers believing that such influences are resident in the sexual cells at the time of impregnation, others that the subsequent environment of the fertilized egg is responsible for all deviations from the normal. There is a very popular belief that external influences, such as will affect the senses of the mother, are common causes of birth marks, malformations, etc., but such cases can, in most instances at least, be explained on some other basis. There is an equally popular belief that congress of man with lower animals gives rise to various forms of monsters, but authentic reports of such cases are not to be found in medical literature.

By subjecting the living eggs of some lower animals to unusual conditions, which include both mechanical and chemical interference with normal development,

various strangely formed beings, closely approximating the monsters occurring naturally in higher animals, have been produced. For example, frogs with typical *spina bifida* have been produced by placing the developing embryos in a six-tenths of one percent sodium chlorid solution, and fifty percent of the eggs of certain other low forms, when placed in a solution of magnesium chlorid, develop into one-eyed monsters (cyclops). Mechanical interference with the developing ovum has likewise resulted in the appearance of supernumerary appendages.

On the other hand there is a tendency toward the transmission of any congenital physical infirmity to the next generation, several members of the same family often showing the same structural defects. It would seem therefore that the influence producing a monster may be either germinal and hereditary, or the result of external influences acting upon the normal germ.

Twins and Double Monsters

Following fertilization the egg normally begins to divide, the resulting cell mass developing into a single normal being. If, however, the two cells resulting from the first division of the egg become separated, each may develop into a complete individual identical in all important respects with its fellow. Such twins are known as homologous twins because of their close resemblance to each other. They are always enclosed in the same chorion and are therefore also known as monochorionic twins. Such partition of the ovum in the two-cell stage has been artificially accomplished in the sea-urchin. The production of homologous twins may therefore be regarded as an exaggerated phase of excessive development, there being a complete and perfect duplicity of all parts. If, instead of a complete division of the cell mass there occurs only a partial separation, some form of double monster results.

In domestic animals more or less complete fusion of the two individuals at one or the other extremity is the most prevalent type of double monster. The union most commonly occurs along the line of the vertebral column, which in rare instances is double throughout, but usually single at either the cephalic or sacral extremity. The number of appendages depends upon whether or not there is complete or incomplete duplicity of the shoulder and pelvic girdles.

In human practice a number of cases of practically complete duplicity of all parts, but with the two bodies joined, are on record. The best known case of this kind is that of the Siamese twins who were joined by a cartilaginous band about four inches in length, which extended between their ensiform cartilages. Within this connecting band some visceral structures were found. These twins were so perfect in formation that they lived to a ripe age, each marrying and rearing a family. Other less notable cases of similar union between two individuals are recorded, but of those where the two bodies are more intimately united, only a few have survived. Among these, however, is the rather interesting case of the Jones twins, which were united by their pelves, the two heads lying at the extreme ends of the fused body. These survived for about two years.

In veterinary practice these double monsters are a common cause of fetal dystokia, but, curiously enough, some of the most notable cases in human practice have had an uneventful birth. The mother of the Siamese twins not only survived but subsequently gave birth to eight children, some of whom were twins.

Fetal Parasitism

The existence of one poorly developed organism enclosed within or adherent to the body of another constitutes so-called parasitism. The larger and better developed of the two is known as the autosite, the smaller and more dependent body being the parasite. Regarding the formation of such monsters two theories are held. The first considers that there is simply an inequality in the development of two distinct germinal masses and that therefore parasitism is only a form of double monster, differing from the usual type in the unequal development of the autosite and parasite. The second theory is built upon the possibility of fertilizing one of the polar bodies

thrown off by the egg during maturation. The complete inclusion of the parasite within the autosite is explained by the theory that the secondary cell mass enters the body of the primary along with some part of the embryo which is normally invaginated during development.

Origin of Developmental Errors

Malformations involving the body of a single individual are very common, in fact probably no animal can be considered perfect. It is beyond the scope of this paper, however, to enter upon a classification of even the pronounced types of malformations. All that we can do in the limited time allowed is to draw attention to a few of the more common types and offer some general remarks as to their origin.

Imperfect union of parts which normally fuse accounts for such developmental errors as harelip, cleft palate and spina bifida. Referring to the latter condition, it will be remembered that the neural canal is first a groove, formed by two longitudinal ridges of the outer germ layer, and that normally the margins of this groove fuse in the median line to form the neural tube. Failure of union in any part of this tube therefore permits of protrusion of the meninges, which are usually distended with fluid to form a cyst. Likewise a failure of the palatine plate of the maxillary bone to meet its fellow or the vomer in the median line, results in cleft palate which may be unilateral or bilateral. It may or may not be associated with harelip, a defect due to the same fundamental cause.

Proper development of the ocular and nasal structures is closely dependent upon the development of the forebrain. Imperfect division of the cerebrum into its hemispheres results in imperfect separation of the two optic vesicles and the two eyes may therefore fuse more or less perfectly into one—a condition known as cyclopia. In a typical cyclops the nose is a formless fleshy mass continuous with the frontal structures.

Atresia ani is a fairly common defect and is due to the failure of union between the primitive gut within and the anal pit which is an ingrowth of the outer germ layer. This defect is usually amenable to surgical treatment.

Persistence of the cloaca is a similar defect resulting from an imperfect development of the septum which normally separates the rectum from the uro-genital sinus.

The esophagus and trachea sometimes communicate through a considerable portion of their length which will be understood if we recall that the two tubes were originally one and that they are normally separated by the union of two longitudinal folds growing in from opposite sides of the tube.

Persistent urachus is probably the most common developmental defect met with in the horse. The urachus normally connects the fundus of the bladder with the umbilical opening and its failure to close properly is in a large number of cases due to partial or complete occlusion of the urethra.

Partial or complete absence of such parts as the head, limbs, tail, heart, etc., are thought to be the result of inequalities of pressure from malformed fetal envelopes or amniotic adhesions. It is probable also that entanglement of parts within a coil of the umbilical cord may result in their faulty development, or even intra-uterine amputation.

The occurrence of supernumerary digits is not easily explained although in many instances the tendency is clearly hereditary. In the horse and other solipeds a reversion to the ancestral type seems to be a plausible explanation, but where six digits appear in animals normally possessing five, this explanation is far fetched, inasmuch as no ancestor is known to have possessed more than five digits. Amniotic adhesions are also thought to be responsible for such excessive development, but it must be remembered that the same condition occurs in amphibia which have no amnion.

Cryptorchidism is a very common developmental error, the causes of which are rather obscure. Almost invariably however, the retained testicle is imperfectly developed, which may be either the cause or the result of its retention. This condi-

tion is readily corrected by operative procedure in so far as the individual is concerned, but unfortunately there is no way of overcoming the hereditary tendency.

True hermaphroditism is rare, but various degrees of perverted development of the sexual organs are common. Depending upon the degree of perversion the animal may or may not be placed in the class of false hermaphrodites. The theory that no animal is purely male or purely female, but that each individual possesses one dominant and one suppressed sex is now quiet generally held.

In considering this form of developmental error, all that we need do is to bear in mind that up until the fifth or sixth week the structures which ultimately develop into sexual organs have not as yet shown any indication of sex. Male development follows a course in one direction, female development takes a different course. Partial development of both sexes is therefore easily possible although the causative factor is unknown.

Various forms of neoplasms might, in a sense, be considered analogous to malformations, inasmuch as they are regarded as being developed from misplaced embryonic cells. It is beyond the province of this paper, however, to enter upon this broad field. Many other malformations might be considered in detail if time permitted, but we have attempted to cover in a very general way the principal types in the hope that a clearer understanding of the underlying causes of all developmental defects might be had.

In conclusion we will reiterate that while the actual cause of any congenital malformation must be more or less in doubt, there are nevertheless two general influences operating. The one is resident within the sexual cell along with other hereditary elements; the other influence is brought to bear upon the embryonic mass at some subsequent period. Either one alone or both influences combined may, therefore, result in a departure from the normal course of development.

Wound Healing

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THE subject of wound healing is not new. It has been discussed by eminent pathologists and surgeons for hundreds of years. This, like some other problems in pathologic surgery, appears to especially attract the attention of the general medical profession periodically and spasmodically. Thus, Lister's principles of antiseptic dressings and aseptic surgery caused marked modifications of methods in wound treatment and resulted in a great advancement of surgery. Listerian principles are not so universally employed by veterinarians as they should be, the reason for the existence of this state of affairs is difficult of explanation.

Bacterins an Aid in Wound Treatment

Recently, following the lead of medical investigators, another advancement has been gained in the knowledge of wound healing. This newer method consists of increasing the animal's resistance to infection by the stimulation of its tissues to form specific opsonins. Opsonic therapy is and has been increasing the possibilities of the surgery and rendering all major operations less hazardous.

Wounds and Their Classification

A wound may be defined as an interruption of the continuity of tissue or tissues. Some have restricted the term to those conditions resulting from traumatism. Others have confined it to injuries of soft tissues, still others maintain that wounds occur only upon the surface. There are no good reasons for these restrictions, because thermic and chemic influences produce interruption of tissues which are not unlike and

are not distinguished from wounds mechanically inflicted; again, a fracture is a break in the continuity of osseous tissue and is repaired in exactly the same way as in a wound in soft tissue, and further, a rupture, as of the liver or spleen, is characterized by tissue destruction and interruption of the continuity of the integral parts of the injured organ, all of which are conditions not easily differentiated pathologically from wounds. Usually the term "wound" is restricted to those injuries that are produced by sudden violent action; thus ulcers and necrotic tubercular centers are not wounds. A bruise may or may not be a wound, depending upon the nature of the lesion; that is, whether or not an interruption of the tissue has been affected.

There are a variety of ways of classifying wounds, of which the following will serve for discussion: Etiologically, wounds may be traumatic, chemic or thermic. Topographically, wounds may be surface or subsurface, and again they may be facial, cervical, thoracic, abdominal, etc. According to character, wounds may be incised, punctured, lacerated, contused, as produced by a stab, shot or bullet, or a bite. As to condition, wounds may be infected or non-infected.

How Wound Healing is Accomplished

Wound healing is the simultaneous regeneration of the tissue of an area in which there has been previous destruction. Traumatic wounds usually heal more readily than wounds resulting from thermic or chemic causes, because traumatisms are the result of mechanical force only, and the destructive influence ceases immediately upon removal of the cause, whereas the influence of thermic, and especially chemic causes continue for a variable period.

Many methods of wound healing have been described, such as immediate union, primary union, secondary union, tertiary union or intention, healing under a scab, etc. When the exact conditions are understood, it is found that practically all wound healing is of one or the other of two types, primary union or first intention, and healing by secondary union or granulation.

The process of healing by primary union embraces coagulation of the hemorrhage extravasate, agglutination of the wound margins, hyperemia, inflammation, vascularization, fibrous formation, disintegration of the hemorrhage extravasate and inflammatory exudate, cicatrization, epithelization and substitution, the time required for the latter being much greater than the former.

The other type of healing—that is, by granulation—is the type usually observed in the majority of wounds in the domestic animals. It is this type in which there is a continued infection and a continual destruction of the newly generated tissue, thus necessarily increasing the length of time required for the wound gap to be filled with new tissue. This type of wound healing can be obtained by any one and under any conditions surrounding it. It is certainly no credit to a veterinarian to have under his care several cases of wound healing in which the method of healing is by granulation.

Prevailing Methods Deplorable

Healing by primary union is desirable in all wounds. Unfortunately, this method of wound healing is not obtained as frequently as it should be in veterinary practice. The majority of practitioners have thus far not attempted to obtain primary wound healing in any except small surgical wounds. Often surgeons do not properly prepare their fields of operation and do not give the proper care and after-treatment of surgical wounds to favor this type of healing. This is deplorable, and is one of the most frequent causes of condemnation of veterinarians. Why veterinarians take no more pains than they do to observe antiseptic precautions in their surgical operations is difficult to explain. Most practitioners make the plea that they have not the time to do aseptic surgery, and that there clientele will not pay for this kind of operations. Such surgeons are really to be pitied, for it is indicative of improper understanding of aseptic surgery, as well as showing that they have failed to impress their clientele by their surgical efficiency.

Advantages of Good Surgery

If a surgeon will successfully perform two or three aseptic surgical operations, in which the wounds heal by primary union, he will have no difficulty in obtaining the future cases and a good fee for aseptic surgical operations in the same community. It is not an impossibility and, further, it is not difficult, to obtain primary wound healing even in large lacerated wounds. Certainly, time is required to prepare the wound, but after the first dressing, little, if any attention is required, and the advantages obtained more than offset the extra time required in placing the wound in such a condition that it will heal by primary union. This type of healing is rapid, and it usually does not leave an unsightly scar; thus the animal is back into service in a very short time. The value of the animal is not depreciated by unsightly scars and the actual time required of the surgeon is less than it would have been had he permitted the wound to remain infected and thus require daily treatments.

Aseptic Surgery and Wound Dressing

Large lacerated wounds are properly prepared by first shaving the hair from all adjacent tissues, then thoroughly cleansing the wound and marginal tissues and removing all fragments of tissue, after which the wound margins are brought in apposition and maintained in a fixed immobile position. The method of procedure that should be resorted to in cleansing a wound prior to bringing the various parts of it in apposition with sutures or otherwise, should be determined by the nature of the wound. In a lacerated wound in which there has been introduced filth, as dirt, fecal matter, hair, etc., the parts should be thoroughly washed with physiologic salt solution until the filth has been entirely removed. The tissue shreds should then be removed by the use of sterile instruments, and some disinfectant used in further cleansing the part. The application of the disinfectant should be again followed by washing with sterile physiologic salt solution, for be it remembered that if disinfectants are applied tissues are destroyed, the extent of which will depend upon the strength of the disinfectant and the duration of its application; the purpose of the application of the disinfectant is to insure the destruction of all infectious agents, and the object of the application of the salt solution after the disinfectant is to wash away all excess disinfectant.

Such treatment of a wound will necessarily require considerable time. I have seen some such wound treatment, and in one instance I remember where the irrigation with the salt solution was continued for four to five successive hours, and in this wound some thirty sutures were taken, the wound healed by primary union and the animal was back in service within a week.

If a lacerated wound is fresh and clean, thorough irrigation for from thirty minutes to two hours with a salt solution is preferred without the application of a disinfectant.

After the wound is thoroughly cleansed, the various parts of it may be adjusted, the kind of suture and the method of suturing depending upon the nature of the wound, always selecting that type of suture which will hold it in the best position with the least destruction of tissue. When a wound is sutured, especially if it is of large size, it is necessary to provide it with drainage.

In the treatment of granulation wounds of long standing, it is possible in many instances to render them aseptic and bring the wound margins in apposition, and thus induce primary union. In some instances, however, there is so much tissue destroyed that it is impossible to obtain immediate union, even though the wound is thoroughly cleansed.

Antiseptics Often Misused

There is no question but that the application of antiseptics as frequently practised is harmful, and that the tissues are frequently injured and wound healing retarded by the application of such agents. Wounds are protected by the inflammatory exudate which usually oozes to the surface, thus favoring granulation, which ultimately results in the filling of the gap, in completing union of the tissues, the time required being much less than if tissues are repeatedly destroyed by the frequent application of antiseptics.

The Vitality of Reproductive Cells

By L. L. LEWIS, M. S., D. V. M., Stillwater, Oklahoma

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EDITOR'S NOTE.—The following paragraphs are excerpted from Bulletin 96 of Agricultural Experiment Station, Stillwater, Oklahoma. In this bulletin which is an exceedingly valuable one for veterinarians, is given in great detail a record of the many interesting experiments upon which the statements and conclusions in this article are based.

IT is often asserted by the breeder and others who are familiar with many of the various problems connected with animal breeding, that the sperm cells will live for days or even weeks in the organs of the female. It is very important to know the length of time the sperm cells will live under natural conditions, as this information, taken in connection with a knowledge of the time at which the egg cells of ovules escape from the ovary, makes our information in connection with certain phases of animal breeding definite instead of a matter of guesswork. The vitality of the sperm cell outside of the body, or under laboratory conditions, no matter how favorable these conditions have been, is a question of hours and not one of days or weeks.

While there is of course an incalculable difference so far as conditions are concerned in the organs of the female and in the conditions imposed by laboratory experiments, yet as the result of these experiments, both laboratory and actual breeding work, the sperm cells have been found to be short-lived. In addition to this, these cells are are extremely sensitive to any unfavorable influences such as the presence of other fluids, as urine or water, or to the presence of chemicals in very small amounts. In general it may be said that variations of temperature exert a less harmful effect upon the vitality of the sperm cells than any other condition imposed by the experiments.

Longevity of Sperm Cells in Utero

In order to determine the length of time the cells will live in the body of the female a number of sows were killed at varying lengths of time after they were bred, and microscopic examinations were made of the organs for live sperm cells; the ovaries were also examined in order to learn as nearly as possible the time at which the ovum was liberated from the ovary. In the experiments that were carried out to determine the question of vitality of the sperm cells it was found that there was a difference of only a few hours on the length of time these cells will live under laboratory conditions and the length of time they will live in the body of the animal when introduced either by service or by artificial means, such as gelatine capsules, parchment bags, and so forth. However, there is a great variation in the vitality of the sperm cells from different individuals, as well as some variation in the vitality of the sperm cells from the same individual at different times. The experiments under this head are logically divided into two groups.

A knowledge of the vitality of sperm cells is very important in breeding work, especially when the use of artificial means by which the semen may be introduced into the organs of the female is to be considered. These experiments have not yet determined whether the loss of the ability to fertilize is coincident with the apparent loss of vitality as determined by microscopic examination, or whether the ability to fertilize is lost for some time before movement finally ceases.

When it is considered that under a great variety of laboratory conditions tests of the vitality of the cells when placed in the organs of the female in bags of parchment, celloidin, and so forth, and the examination of the organs from a number of sows killed at varying lengths of time after breeding, all confirm the statement that the sperm cells of some of the domestic animals are

short-lived under either normal or abnormal conditions, it is evident that a definite knowledge of the vitality of the male cells and of the conditions affecting this vitality will be of immense advantage in animal breeding.

The idea is quite common among breeders that the sperm cells will live for several days in the organs of the female. This belief is so firmly fixed in the minds of some breeders that they will breed mares out of season expecting that the sperm cells will be present when the period of heat arrives and that the egg or ovum will be fertilized from a service several days previous. If any results follow breeding of this kind they may be explained on one or two suppositions:

First, that ovulation was not coincident with the ordinary signs of heat, which undoubtedly may be true occasionally, and especially so in the mare.

Second, that the egg cell or ovum produced at the last period of heat was retained in the womb and was still capable of being fertilized.

If it is assumed that the escape of the egg from the ovary in the mare or sow is coincident with the ordinary signs of heat, then breeding between periods of heat will be without results unless the ovum is retained for a number of days after the period of heat has passed, as the sperm cells do not appear to live for a sufficient length of time to enable them to fertilize an ovum produced at a subsequent period of heat, unless the liberation of the egg should follow within a short time after breeding. The statement is also made that the sperm cells will live for days in the organs of the male after death or after removal of the organs by castration.

Longevity of Sperms in Excised Testes

In order to get some idea of the length of time the cells would live in the gland the following observations were made: Three young boars were castrated and examination made of the testicles. One of them was a poor breeder; the others were vigorous young males weighing about 250 pounds each. After castrating the hogs the testicles were taken to the laboratory and kept at room temperature—22° C. Material for examination was taken from the body of the gland, from the epidydimus, and from the spermatic cord.

In the testes from normal males the vitality of the sperm cells decreased in about the same manner as they would if kept in a glass vessel and under the same conditions of temperature. After three hours there was approximately sixty to seventy percent alive. At this time the observations were discontinued until the next morning, or eighteen hours after the glands were removed. A very careful examination at this time failed to show any of the cells alive. In the glands secured from the male that was a poor breeder practically all of the cells were dead after three hours. There is little doubt but that practically the same results would be obtained by an examination of the testes of the stallion or bull.

Need for Scientific Knowledge of Breeding

A thorough knowledge of the time that ovulation takes place as compared with the first signs of heat, combined with a knowledge of the vitality of the sperm and of the conditions in the body of the female affecting vitality, are matters that need careful investigation in all cases. Breeding should be placed on a scientific basis and should keep pace with other lines of work. Scientific methods are practised and careful studies made in practically all lines of work; but at present very little study has been given to this most important matter from the exact or scientific side. The problem has been treated very much as if there was nothing to learn, or else nothing to be gained in a practical way through scientific research. This does not seem to be a reasonable view to take of any question, much less one where so many failures result from some cause, and in most cases from causes that in all probability might be remedied.

There are many animals that are considered barren that would have a great value if they could be bred, and it is only by a study of the various problems connected with animal breeding that we can hope to come to any conclusion as to the

reason for many of the things that are now regarded as beyond our reach and therefore not to be remedied or interfered with in any manner.

Relation of Estrum to Rupture of Graaffian Follicles

It was thought advisable in connection with the preliminary experiments to determine as nearly as possible the length of time after coming in heat before it was possible for the ovum or egg cell to become fertilized. The period of heat is usually associated with certain physiological conditions or changes in the ovary, and it is during this period of sexual excitement that the ovum escapes from the ovary into the oviduct and finally enters the uterine horn, where, if it is fertilized, it develops into a new organism.

Hogs were selected for this work principally on account of the ease with which one may determine when the period of heat begins. Twenty-five sows were used in the experiment. Some of the sows had farrowed litters of pigs, some were non-breeders, and a considerable number were young hogs that had never been bred. The sows were kept in an open shed and a male was penned in one corner of the lot and was turned in among the sows once or twice daily. In those cases where the period of heat began during the day a very correct estimate could be made as to the time of coming in heat, but in those cases that were not in heat late in the afternoon, but were in heat the next morning, only an approximate estimate could be made of the exact time of coming in heat.

In addition to learning the length of time after heat began before ovulation occurred the sows were bred and killed at varying lengths of time after breeding in order to determine the length of time the sperm cells retained their vitality. By making microscopic examinations of scrapings from the uterus and uterine horns some data was gathered as to the length of time the sperm cells live in the organs of the sow under normal conditions.

The chances for error in observations of this character cannot be entirely eliminated. For example, it is impossible to examine scrapings from all portions of the body of the uterus or of the cornu within any reasonable time. A number of preparations were always made from various parts of the organs and experience in the work soon showed that we might easily expect to find sperm cells at the point of union of the oviduct and uterine horn. Material from this point was usually examined first, after which the uterine horns and body of the uterus were cut at various places and scrapings secured for examination. It will be seen that the possibilities of overlooking occasional live cells are very great.

However, it seems that with the care that was taken in making the examinations and the average results obtained from a considerable number of cases that these experiments represent a fairly accurate and average estimate of the length of time that the sperm cells will live in the organs of the sow. There is no difficulty in determining whether the graaffian follicles are ruptured or not, consequently the time given in the table at the end of this topic as the time elapsing from the time the period of heat began until the follicles were ruptured may be considered as fairly representative for this group of animals. The time may vary in other groups of animals, as for example in sheep, cattle or horses.

Death of Sperm Cells in the Uterus Rapid

One very noticeable feature of the examinations was the scarcity of sperm cells in the uterus within a short time after breeding. If the examinations were made within one or two hours after breeding an abundance of sperm cells were found and the percent of live cells was accordingly high. As the length of time after breeding increases the number of sperm cells found, as well as the number alive, decreases very rapidly until within a comparatively few hours after breeding not only will there be no live sperm cells found, but all of the sperm cells have disappeared.

A microscopic examination of the scrapings from the body of the uterus or from the cornu will show a great number of leucocytes. Phagocytic action of the white cells upon the sperm cells was not noted, but it is possible that these blood cells do

take an important part in the disappearance of the semen cells.

In the experiments conducted during 1908-1909 the sows were bred at varying lengths of time after coming in heat and then killed from four to forty-seven hours later. In this experiment it was noted that the sperm cells did not live a great length of time and that in a comparatively short time all of the cells had disappeared. In order to get more data along this line some of the sows used in experiments in 1910 were bred and killed within a few hours after breeding. Sow No. 135 was bred out of heat and killed twenty-one hours later. An examination of the organs showed semen present in the uterine horn and an abundance of sperm cells. Those alive being approximately ten percent of the number present. On December 22, 1910, two sows, Nos. 343 and 350, were bred to different males. Sow No. 343 was in heat, and sow Bo. 350 was not in heat. These sows were killed twenty-four hours after they were bred.

The total number of sows used in this experiment was twenty-five. The males used were two mature Berkshire boars. Semen was secured from these males and an examination showed that the vitality of the sperm cells was that of the average male hog. In only three cases of the experiments of 1908–1909 could live sperm cells be found at a greater length of time than twenty hours after breeding. In two cases live cells were found after a lapse of more than forty hours, and in one case after a lapse of twenty-two and one-half hours.

Of the nineteen sows bred and killed, the sperm cells were found dead in eighty percent of the cases examined where a period of sixteen hours or more had elapsed between the hour of service and the time when killed for examination. This estimate does not include those cases numbered from twenty-one to twenty-five, as they were bred to a boar that was afterwards found to be lacking in vitality of semen.

Ovulation During the Latter Part of the Period of Estrum

It is not likely that ovulation occurs in hogs to any extent except when accompanied by the usual signs of heat. In all of the cases killed during the period of heat where the sow was considered normal the ovaries showed that the usual physiological changes

No. of Case	Date	Hours from Time of Coming in Heat until Killed	Condition of the Ovaries When Killed	H'rs from Time of Breeding Until Killed	Condition of Sperm Cells in Organs when Sow was Killed
	1908				
1	May 30	25.5	No follicles ruptured	16	Found live cells
2	July 1	50	Follicles ruptured	....	Was not bred
3	" 10	46.5	No follicles ruptured	22.5	Found live cells
4	Nov. 17	24.5	Ten ruptured, two not	7	Found live cells
5	Dec. 2	29	No follicles ruptured	24	No live sperm cells
6	" 3	11	No follicles ruptured	10	Found live cells
7	" 3	11.5	No follicles ruptured	7.5	Found live cells
8	" 5	42	Follicles ruptured	25	No live sperm cells
9	" 7	51.5	Follicles ruptured	41.5	Live sperm cells
10	" 7	50.5	Follicles ruptured	40.5	Live sperm cells
11	" 8	6.5	No follicles ruptured	4	Live sperm cells
12	" 9	33	Follicles ruptured	24	No live sperm cells
13	" 10	28	No follicles ruptured	19	No live sperm cells
14	" 10	32	No follicles ruptured	....	Was not bred
15	" 12	58	Follicles ruptured	18	No live sperm cells
	1909				
16	Feb. 12	33.5	Eleven ruptured, 4 not	20	No live sperm cells
17	Feb. 12	30.5	Follicles not developed	21	No live sperm cells
18	Was not in heat and was not bred				
19	Was not in heat and was not bred				
20	Mar. 1	32	No follicles ruptured	16	Live sperm cells
21	" 1	70	No follicles ruptured	16	No live sperm cells
22	" 1	53	Follicles ruptured	47	No live sperm cells
23	" 5	30	Eight ruptured, 6 not	24	No live sperm cells
24	" 10	29	No follicles ruptured	6	No live sperm cells
25	" 14	36	Follicles ruptured	4	Live sperm cells

were taking place. If the hog was killed early in the period of heat the follicles showed perfect and unruptured, while those from hogs killed a few hours later showed the follicles ruptured. In no case were the follicles ruptured prior to the estrum or within a few hours thereafter.

A few sows were killed when not in heat, and in none of these were the follicles found well developed or in condition to liberate the ovum, neither did they show any signs of the recent escape of the ovum from the organ. Variations from the normal no doubt do occur, but it is safe to assume that in the great majority of cases the follicles do not rupture before thirty hours after the period of heat begins. In one case the follicles were not ruptured after the lapse of more than seventy hours, and in another after a lapse of more than forty-five hours.

As compared with the data obtained from the remainder of the cases examined these are unusual. In no case were the follicles found ruptured during the first twenty-four hours of heat, and in most of the cases a period of thirty hours elapsed after the first signs of heat before many of the egg cells escaped from the ovary.

By studying tables under this experiment it will be seen that as a rule certain conditions of the organs are found within rather narrow limits of time after the period of heat begins. In only one of the cases were the follicles found ruptured before a lapse of thirty hours after coming in heat.

The following tabulated statement will show the results obtained when sows were bred out of heat:

No.	No. times Bred (Out of Heat)	Results of Breeding	Time After Heat Before Bred (Days)
130	2	Successful	1, in each case
131	2	No results	2 and 1
132	2	"	2 and 5
133	3	"	30, 2 and 2
134	2	"	7 and 10
135	3	"	5, 3 and 2
137	3	"	1, 3 and 5
138	2	"	1 and 2
141	3	"	5, 2 and 2
142	3	"	2, 4 and 1
143	4	Successful	10, 4, 4, and 1
144	3	No results	6, 2 and 2
145	2	"	20 and 5

Vitality of the Egg Cell or Ovum

It seems quite as important to know something of the general vitality of the egg cell as it is to know the vitality of the sperm cell. A study of the vitality of the egg cell is not as easily made as is that of the sperm, yet the results of the limited number of experiments conducted seem to indicate that from a physiological standpoint the vitality of the ovum or egg may be determined quite definitely.

To determine this question sows were bred at varying lengths of time after the period of heat had passed (see records of Sows Nos. 130–145), as it was thought that the ova would be fertilized if they were in such physiological condition as to be capable of fertilization. Previous observations had shown that the ova are not liberated from the ovaries during the early period of heat, but are liberated during the latter part of the period of heat. A number of sows were used in this experiment. Records were kept as to the time the period of heat began, and in nearly all cases the date was noted when the period of heat ended. By breeding at different lengths of time after the period of heat ended very good evidence was obtained regarding the length of time the egg cell is capable of being fertilized after it leaves the ovary.

By referring to the foregoing table of the hogs used in this test, information may be obtained relative to the vitality of the ovum. Data is given covering the experiments with thirteen sows that were bred out of heat. Thirty-four services were given these hogs while out of heat; seven services were given on the first day after the period of heat had passed, with successful results following in only two cases. If, as previous observations seem to show, the egg cell is not liberated from the ovary until near the close of the period of heat, and more than 70 per cent of the breeding is without results when service is given within twenty-four hours after the period of heat, and no results follow from breeding at a later day, it would seem that *the ovum does not retain its vitality more than a few hours* after being liberated from the graaffian follicles and breeding out of heat usually results in failure.

Very good evidence has been obtained that the sperm cell will not live for a great length of time in the body of the female. Many of the sows in this experiment were bred out of heat and observations continued in some cases for more than four months, and in no case was there any result from breeding out of heat where more than twenty-four hours elapsed after the period of heat. If the sperm cell will live for two or three weeks, then fertilization of the ova should occur at the first period of heat following the breeding. The time intervening from the time the sow was bred out of heat until she was in heat again varied in the several cases from seven to twenty-two days.

It may be that in drawing conclusions in regard to this work that factors are to be considered that we have no intimate knowledge of, yet the observations made on post-mortem examinations and results following breeding out of heat indicate that the ovum and sperm cell soon lose their physiological activity after they became separated from the ovary and testes.

Vitality of Semen Under Laboratory Condition

In connection with the series of experiments just reported, in which the data seems to show that the vitality of the sperm cell of the hog under normal breeding conditions is relatively short, it will be of interest to note the data connected with observations on the vitality of the semen under laboratory conditions.

From the experiments it was seen that under experimental conditions the vitality of the sperm cells from the boar continues approximately fifteen to twenty-five hours after the semen is collected. The length of time depending upon the temperature at which the semen is kept and the vigor and physical condition of the animal used in the experiment. Temperature has much the same effect on the vitality of the semen from the hog as it has on that collected from the horse.

The direct sunlight is quickly fatal to the sperm cells and diffused light is harmful to some extent, although in the ordinary light of the laboratory where the samples were kept, fifteen to twenty feet from the window, it seemed to have very little effect.

Semen from different males varies greatly in its vitality under laboratory conditions. This difference is sometimes so noticeable as to indicate the probability of poor breeding qualities.

The Effect of Continuous Service

It is of considerable importance to know the effect of continuous breeding on the vitality and number of sperm cells, and particularly to know the effect upon the vitality of the cells. Some breeders make a practice of crowding a stallion or jack with services, often with poor returns in the matter of a very low percent of foals. The effect of frequent service is, however, a matter in which the individuality of the horse plays a very great part. The number and vitality of the sperm cells may be reduced in the semen from one horse by five or six services as much as it would be in another individual by two weeks' continuous service. Some idea of this general effect may be drawn from the general temperament of the animal, but this cannot always hold good.

In order to secure some data along this particular line use was made of two stallions owned by the college. One of the horses is of the heavy draft breed, six years old and of a sluggish temperament. The other horse is a grade Shire stallion, five years old and is a very vigorous and well developed horse. He is not of the nervous temperament often seen in the light breeds of horses, but is not to be considered of a sluggish disposition. These horses were used not only in this test, but were used in other experiments connected with this work. The grade stallion has been used for most of the work reported in this bulletin where the vitality of the semen from the horse was studied. The general plan of the experiment was to breed the stallion daily and to secure samples of the semen for laboratory work in order to make a count of the number of sperm cells present as well as to determine the length of time they would retain their vitality under laboratory conditions.

In preparing the semen so as to make a count of the cells present, the following procedure was used:

From the entire lot of semen that was collected, one cubic centimeter was taken and added to twenty-four cubic centimeters of a two percent solution of sodium carbonate. The apparatus used for counting the sperm cells was the Thoma-Zeiss Hemacytometer. Usually two hundred squares were counted in each preparation, and as a rule two preparations were made from each dilution. After using a number of different solutions for diluting the semen the carbonate solution was finally selected as giving the best results, as it prevented the clumping of the sperm cells.

The following table summarizes the results obtained with the draft stallion in this test. He was bred each day, as shown by the table, the semen was collected either from the horse or from vagina of the mare, was carried to the laboratory in a clean warm glass vessel and examined immediately to determine the general condition as to vitality.

Date and Time of Service	Time Semen Lived at 21-23° C.	Time Semen Lived at 31-35° C.	No Sperm Cells per Cubit Millimeter
(1908)			
Feb. 13, 8:30 a. m.	20% alive after 9.5 hrs.	5% alive after 9.5 hrs.	131,750
Feb. 14, 9:00 a. m.	No sample of semen obtained	No sample of semen obtained	
Feb. 15, 8:30 a.m.	5% alive after 9.5 hrs	No cells alive after 6 hrs.	100,625
Feb. 16, 2:30 a.m.	10% alive after 7.5 hrs.	10 %alive after 5.5 hrs.	78,000
Feb. 17, 9:00 a.m.	No cells alive after 9 hrs.	No cells alive after 6.5 hrs.	97,875
Feb. 18, 3:00 p.m.	5% alive after 5 hrs.	No cells alive after 4 hrs.	54,280
Feb. 19, 2:00 p.m.	2% alive after 4 hrs.	No cells alive after 3 hrs.	53,780
Feb. 20, 9:00 a.m.	No cells alive after 4 hrs.	No cells alive after 3 hrs.	51,480
Feb. 21, 8:45 a.m.	No cells alive after 4.5 hrs		5,840

The number of sperm cells in the semen rapidly decreased from 131,750 per cubic millimeter to 5,840 per cubic millimeter in nine services. The quantity collected at the first service of the test was sixty-five Cc. (about two ounces), while at the last service all that could be collected was five Cc. The horse was not bred again until March 11, when sixty Cc. of semen was collected. The laboratory notes kept of this material show that five percent of the sperm cells were alive after seven hours when kept at 30° C. and that fifteen percent were alive after eight and one-half hours in the lot kept at 22° C. The semen had 127,625 sperm cells per cubic millimeter. It is not likely that all of the time from February 21, the last day of the test, until March 11, the first service made by the horse after the test, was required for the semen to regain its normal condition as to number and vitality of the sperm cells. After continuous service, when the number and vitality of the sperm cells have fallen below normal, the return to normal conditions was noted within seven to ten days and in some cases less time was required.

Summary

First: The vitality of the reproductive cells of the hog is only a few hours. In most cases the ovum appears to lose its power of being fertilized within forty-eight hours, and the sperm cell does not appear to possess much if any greater vitality.

Second: The number and vitality of the sperm cells from the stallion decrease rapidly where one or two services are given daily.

Third: The ovum (in hogs) is not liberated from the ovary until the last part of the period of heat.

Fourth: The sperm cells are very sensitive to high temperatures and chemicals. Apparently low temperatures have less effect on their vitality than any other conditions tested.

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Pittsburg, Pa.

PERMIT me to compliment you on the May number of AMERICAN JOURNAL OF VETERINARY MEDICINE. Great luck to you.
T. B. HINKLE, '12.
Columbus, O.

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Federal Meat Inspection a Fraud Charges Mrs. Crane

SINCE Upton Sinclair "jungled" through Packingtown and got away with it, muckraking has been popular—an easy road to notoriety. Upton achieved fame, fortune and finally his wife got an affinity from his muckraking, and so, perhaps on the whole, the score is even in his case.

In the present three-cornered charges brought against the Federal Meat Inspection Mrs. Caroline Bartlett Crane gets notoriety, Representative Nelson gets duped, Mrs. Scott Durand gets revenge for the loss of some tuberculous cows, Doctor Burrows gets what the little boy shot at, Congress gets imposed upon, the Bureau of Animal Industry gets the "hooks," and the live-stock industry "gets it in the neck."

Mrs. Caroline Bartlett Crane is a professional investigator; to her nostrils the scent of a scandal is as the notice of a reward to the Burns Detective Agency, a bird in the hand—almost, the basis is to be had for going after. Mrs. Crane "bobbed up" with practically these same charges before the American Public Health Association at its meeting in Richmond two years ago; but failed to make good—to attract attention—nothing else can be hoped for, from them. The executive committee of the Public Health Association, heard her charges, weighed her evidence and said "thumbs down" and her unsubstantiated charges based upon "facts" gathered at great expense yet lie on an old rickety table in Richmond.

Mrs. Crane, who is a woman of remarkable intelligence, struck a responsive chord in representative Nelson of Wisconsin whose constituency is composed of dairy people who hate the dairy cow's brother and the wicked packers who make oleomargarine from his carcass. These sentiments may be in part responsible for his taking up these charges though no intelligent person can think that condemned animals are the packers' loss and that the burden of stricter inspection regulations would not be borne

by the stock raisers and the ultimate consumers of meat.

The livestock press has scouted the idea of fraud in the Federal meat inspection, ridiculed the charges against it, and deplored the effect it may have upon the public. The agricultural press has deprecated the charges and refuted them in an argumentative way, the city papers have "played up" the story in a sensational manner and the *Chicago Tribune*, "the world's meanest newspaper," has tried to make political capital out of the tendency of the House of Representatives to deny the investigation asked for by Representative Nelson.

Every veterinarian must have read something if not all of these charges in the daily press and it is unnecessary to quote them here in all their multitudinous "whereases" and fulsomeness of prolixity. They constitute a curious blend af brazen falsehoods, half-truths and unimportant facts.

Mrs. Crane's strongest card is the assertion that tuberculous and other diseased animals are passed for food to the detriment of the public health. This is partly true; perhaps no animal that is passed for food by the officials of the Department of Agriculture is in *perfect* health—absolutely free from all infections and lesions of disease. The department regulations for disposal of slightly diseased carcasses have the endorsement of the most eminent pathologists in the United States; men outside of the Bureau of Animal Industry and not susceptible of influence either by the department or by the packers.

The charge that these regulations nullify the meat inspection law of 1906 and that the standards are lower and the inspection more lax now than prior to 1906 is absurdly false as the records of the department show that the percentage increase in condemnation is over fifty percent higher since 1906 than it was prior to that date. The standard for the passing of meat in the United States is higher than in any other country in the world. The inspection fully safeguards the public health, giving the public the benefit of the doubt in every case where there is a doubt. Shall these regulations be rejected to gratify the caprice of faddists whose views are rejected by the best scientists of the world? Representative Nelson desires this.

It is due the officials of the Department of Agriculture that the investigation asked for be made, and they welcome such an opportunity to refute the charges; yet the investigations will probably not be made. The charges are so palpably false or unimportant; and the livestock interests have too much to lose during the months that it would drag along with sensational newspapers playing upon the sentiments and prejudices of the people.

Mrs. Scott Durand, millionaire proprietor of the "Crab Tree Dairy," Chicago, has been an able second to Mrs. Caroline Bartlett Crane and Representative Nelson in bringing their charges before the House of Representatives.

In several columns of space she tells, having her cows tuberculin tested and passed by a Doctor Lewin, of the rejection of this test by State Veterinarian Wright, the subsequent test of these cows by Bureau veterinarians, and the condemnation of twelve of the cows, and of their being passed for food when slaughtered. All of which may be and probably is true. The majority of tubercular cows unfit for dairy herds make wholesome food when slaughtered and properly trimmed. The public is slow to learn that milk from tubercular cows is condemned in most cases not because it is infectious as secreted but because of the tuberculous discharges that almost invariably reach it after it is drawn.

(*Continued on page 257*)

SUPPORT THE ARMY VETERINARY BILL—NOW

On April 26th, the Military Committee of the House reported out favorably a modified form of the Army Veterinary Bill, which, if it passes, will make veterinarians in the army, officers with rank and commissions of first and second lieutenant. The committee said: "It is thought it will greatly improve the service to give the rank provided in this bill and in that way much money will be saved by virtue of increased

(*Continued on page 257*)

Experiment Station Publications

Trypanosoma Americanum, a common blood parasite of American cattle, Bureau of Animal Industry, Bulletin 145, by Howard Crawley.

This Bulletin represents a further study of the blood parasites described in Bulletin 119 of the Bureau of Animal Industry. Much new information has been evolved from experiments carried on by the Bureau of Animal Industry and compiled from various publications on the subject of Trypanosomes and is given in this bulletin.

The parasite apparently occurs in about seventy-five percent of all American cattle more than one year of age. The numbers of the parasites are but few in the blood of a single animal and it is not shown to be of economic importance.

—

Concrete Construction on the Live-Stock Farm, U. S. Department of Agriculture, Farmers' Bulletin 481.

This bulletin prepared under the direction of the Bureau of Animal Industry gives detailed directions for making concrete feeding floors, watering troughs, manure pits or swimming pools for ducks and dipping vats for cattle and hogs.

Veterinarians may find in it much valuable information regarding the construction of and the use of concrete in and about their hospitals.

—

Practical Methods of Disinfecting Stables, U..S. Department of Agriculture, Farmers' Bulletin 480, by Geo. W. Pope, D. V. S.

This bulletin intended for lay distribution gives detailed information relative to the disinfection of barns with some notes on the construction of sanitary barns together with a short discussion of the relative merit and uses of various common disinfectants. Numerous illustrations of various spray pumps for applying the disinfectants are given. It is surprising to find in this bulletin no reference to the gasoline blow torch, a safe, and one of the most effective means of disinfecting stable walls and mangers.

Hydrocyanic-acid Gas Against Household Insects, U. S. Department of Agriculture, Bureau of Entomology, circular 46, second series, revised edition, by L. O. Howard.

There are occasional circumstances under which a veterinarian may advantageously use hydrocyanic-acid gas, for disinfection. This circular gives complete directions for its successful use.

—

The Parasite Fauna of Colorado by Maurice G. Hall, Science Series No. 10 of Colorado College Publication, Colorado Springs.

This is an unusual and exceedingly interesting publication, giving the names and a complete classification of all the animal parasites known to exist within the state, together with the host on which they have been found and the name of the collector of the specimen reported.

The parasitic fauna of Colorado is thus revealed to be large, including altogether 281 different species, parasites on man, animals and birds.

As a collector of parasites along with his multitudinous other activities we find our old friend Doctor Kaupp, in the first rank although he has been a resident of Colorado only during the past four years.

—

Contagious Abortion of Cows, by W. J. MacNeal, Bulletin 152, Agricultural Experiment Station, Urbana, Illinois.

The vast economic importance of contagious abortion in cattle and horses makes it imperative that veterinarians be familiar with all information to be obtained on these subjects.

The present bulletin though scientific in its method of handling the subject is yet intended for popular distribution and numerous matters of scientific importance are dealt with but briefly. Nevertheless, it is a publication that every veterinarian should possess.

—

Stallion License in Illinois, Bulletin 2, Stallion Registration Board, Springfield, Illinois.

This is a bulletin of 250 pages and numerous half-tone illustrations. It gives the Illinois Stallion Registration Law in full together with various statistics concerning the horse industry in the state with a list of the secretaries of various registry boards, likewise a list of the states having stallion registration laws and the executive officers of each. Considerable information is given as to the workings of the Illinois Stallion Registration Law and what has been accomplished. A section with various illustrations describing unsoundness and disease which disqualify animals for service in the breeding studs constitutes an important part of the bulletin.

The bulk of the publication is given over to a list or directory of the stallions licensed in Illinois prior to November, 1911.

—

Anthrax, by Winfred B. Mack, D. V. M., Agricultural Experiment Station, circular 13, Reno, Nevada.

This publication is intended for popular distribution and is valuable as such.

—

Intracellular Bodies Associated with Equine Anemia, by Winfred B. Mack, D. V. M., Reno, Nevada.

This paper, a reprint of a paper given in the proceedings American Veterinary Medical Association for 1911, records a continuation of Doctor Mack's studies of equine anemia as detailed in his bulletin No. 68 of the Nevada Agricultural Experiment Station published in 1909.

In a limited series of experiments certain "Coccus-like bodies" were found in the blood of cases of swamp fever and were absent in the blood of animals supposed to be free of swamp fever. No definite conclusions as to the identity of these coccus-like bodies are drawn, but the suggestion is made that they may be of diagnostic or even etiologic significance in swamp fever.

—

Investigation Relative to Arsenical Dips as Remedies for Cattle Ticks, Bureau of Animal Industry, Bulletin 144 by B. H. Ransom.

This bulletin contains sixty-five pages and numerous illustrations. It is a very thorough discussion of dips as remedies for cattle ticks.

Some Results of Cattle-Tick Eradication, Bureau of Animal Industry, Circular 196.

The information from which this four-page circular was compiled was obtained from the replies of representative stock men to a number of questions sent out by the local office of the Bureau of Animal Industry of Nashville, Tennessee.

The replies are a revelation as to what has been accomplished for the southland by the Bureau's efforts at cattle-tick eradication.

—

The Pasteurization of Milk, Bureau of Animal Industry, Circular 184, by S. Henry Ayers.

"Efficient pasteurization is a safe means of guarding against infection, and when the temperature of pasteurization is not excessive this process probably causes no injury to the quality or appearance of the milk. Pasteurization also enhances the keeping properties, though the ordinary grades of milk when properly pasteurized under commercial conditions will still sour. It is especially valuable as a means of rendering reasonably safe the ordinary market milk, much of which would otherwise be dangerous to health; yet pasteurization is not to be regarded as a substitute for cleanliness, and its use as an attempt to hide the defects of dirty or otherwise unfit milk should not be countenanced."

Throughout this bulletin, which contains forty-four pages and numerous illustrations, the advantages of pasteurizing market milk are emphasized. Milk dealers, dairymen, and farmers generally should profit from the full information which is given regarding the various methods of pasteurization. The bulletin is indispensable to milk inspectors.

—

Directions for the Home Pasteurization of Milk, Bureau of Animal Industry, Circular 197, by L. A. Rogers.

This four-page circular illustrates and describes briefly, simple methods for the pasteurization of milk in the home. The opening paragraph reads:

(*Continued on page 258*)

WORLDS WORK in Veterinary Science

A digest of all the Current Literature of Comparative Medicine

By Dr L. W Fetzer Washington, D.C.

THE relation between human and animal tuberculosis, by H. Kossel (Prof. of Hygiene, Heidelberg). (Deutsch. Med. Wochenschr. 1912, Vol. 38, No. 16, pp. 740–744).—The author in an address given before the VII International Tuberculosis Congress held at Rome, Italy, Apr. 16–20, 1912, points out that the type of tubercle bacilli present in a given case will serve as a guide to the source of infection. Pulmonary tuberculosis in the human is almost always caused by the human type of bacillus and the infection has its source in man.

The milk or meat from tuberculous animals is supposed to play a very minor part in the dissemination of tuberculosis among the human race. Tuberculosis in in man can therefore only be successfully fought when measures are utilized for preventing the spread of this disease from man to man.

—

A CLINICAL and experimental study of the hemopoietic serum of Carnot, by R. C. Larrabee (Jour. Med. Research, 1911, Vol. 24, No. 2., pp. 345–360, charts 2).—"Hemopoietin" is a substance which was noted by Carnot and Deflandre in the blood of animals which were made anemic by hemorrhage. The serum of such animals was recommended by these authors as a stimulant for the production of red blood corpuscles in various anemias.

The author has investigated the value of this serum, and concludes that he was "unable to verify the work of Carnot either experimentally or clinically. On the experimental side the results were wholly negative, the average change in the red corpuscles after 'hemopoietic serum' being a slight decrease. In a number of instances the injection of the serum was followed by considerable changes, never so great as those observed by the French writers, and apparently representing merely normal fluctuations. The latter were shown, in a few animals, to be much more marked than is commonly supposed.

"The serum was administered to eleven cases of anemia of various sorts. In three there was an immediate increase of red corpuscles exceeding 250,000, the maximum bing 828,000. All were in post-hemorrhagic anemias."

—

IMMUNIZING against Blackleg by O. Schöbl, (Centbl. Bakt. etc. Originale 1912, Vol. 62, No. 3/4, pp. 296–304).—By employing serum obtained from animals immune against the aggresions of the blackleg bacterium an immunity can be obtained in calves and guinea pigs which closely resembles active immunity.

The advantage of using a vaccine of this kind lies in the fact that it is harmless nontoxic and there is no danger of producing an epizootic.

—

THE technic of my precipitation reaction for diagnosing anthrax, by A. Ascoli, (Berlin, Tierärztl. Wochenschr., 1911, Vol. 27, No. 22, pp. 389–390).—Ascoli gives the following directions for conducting his test: A test tube is filled to one-half of its capacity with physiological salt solution and then a few grams of the material to be examined (spleen, muscle, etc.) is added. The tube with its contents is then placed in a boiling water bath for a few minutes, and then rapidly cooled.

The extract so obtained is filtered through some asbestos fibre, held in a small funnel

which is drawn out to a capillary point and which dips into a test tube (with foot) containing some specific anthrax serum. If the material under examination comes from an animal infected with anthrax, a whitish zone is obtained at the point of contact between the extract and serum.

—

TESTS of antirinderpest serum. by A. R. Ward and F. W. Wood (Phillipine Agr. Rev. [English Ed.] 1912, Vol. 5, No. 2, pp. 75–79).—These tests show that antirinderpest serum will not act as a prophylactic, on the contrary, animals previously injected with the serum and then exposed to infection will contract the disease and go through a more or less modified attack.

—

ADMINISTRATION of Nitrous Oxid Gas to Dogs, by H. H. Capes and R. L. Green, (Vet. Rec. 1911, Vol. 24, No. 1219, pp. 306–307).—Repeated anesthization of three dogs—wire-haired terrier bitch, black and tan terrier bitch and pregnant fox terrier bitch, showed that nitrous oxid when given with improved apparatus may eventually be given to dogs over a prolonged period of time. The animals behaved toward the gas very much as man does, viz., good pulse, which is full, firm and slightly increased. Cyanosis when present was noticed on the lips and tongues of the animals. An important feature is the short time required for recovery.

—

SALT treatment for hematuria by Heinrichsen, (Berlin. Tierärztl. Wochnschr. 1912, Vol. 9).—Excellent results were obtained by administering sodium chlorid. A bovine two years old received 100 grams (three ounces) of sodium chlorid in flaxseed mucilage three times daily. Younger animals received correspondingly less. In all cases this treatment was carried on for three consecutive days.

In advanced cases and where marked anemia was present one to two liters of physiological salt solution was given by way of the jugular vein. Where difficulty in passing the urine existed the bladder was washed out with physiological salt solution. The author also found that salt solution could also be used to advantage for foot-and-mouth disease.

—

PERCENTAGE of Parasites found in Dogs, by S. H. Gaiger, (Journal of Tropical Veterinary Science, 1911, Vol. VI, No. 3, p. 296).—Fifty dogs were destroyed with hydrocyanic acid and a careful postmortem examination was made in each case.

The following table shows the number of parasites of each kind present and gives the percentage for each:

	No.	Percentage
Linguatula taenioides	19	38
Spiroptera sanguinolenta	18	36
Ascaris marginata	19	38
Taeniae	45	90
Ankylostoma	19	38
Opisthorcis (norverca?) (liver fluke)	19	38

—

ON THE toxicity of some inorganic and organic compounds of arsenic and their tolerance by the organism by M. L. Launoy (Compt. Rend. Acad. Sci. [Paris], Vol. 151 No. 20, pp. 897–899).—This is a study of the relative toxicity of some commonly used arsenical preparations. For this purpose it was necessary to compare amounts of actual arsenic administered and not the amount of total drug, because preparations of this class contain varying quantities of arsenic and are often not of constant composition. Very often preparations of the same drug from various sources contain different amounts of water of crystallization. Guinea pigs were used in the tests and the arsenicals were injected intraperitoneally. As a standard, the weight of arsenic required to kill a kilogram of guinea pig in 1 to 10 days was utilized. The following results were obtained: Sodium arsenite, 6 to 12 milligrams (gr. 1-10 to 1-5); sodium sulpho-arsenate 8.75 mgm. (gr. 1-7); sodium sulpho-arsenate 9.91 mgm. (gr. 1-6). Of sodium cacodylate, the animal survived a dose of 91 mgm. (grs. 1 1-2); of sodium solpho-cacodylate, it survived a dose of 71 mgm. (grs. 1 1-9); sodium methyl arsenate, 25.4 mgm. (gr. 2-5); sodium sulpho-methylarsenate, 25.6 mgm. (gr. 2-5); atoxyl, 41.8 mgm. (gr. 2-3); solpho-atoxyl,

22.1 mgm. (gr. 1-3); acetylatoxyl, 46.1 mgm. (gr. 5-7); acetyl-sulpho-atoxyl, 26.6 mgm. (gr. 2-5); and colloidal arsenic, 8.3 mgm. (gr. 1-8). The above figures show that where sulphur was substituted for the oxygen in atoxyl and acetylatoxyl (arsacetin) the toxicity was increased to nearly double.

Guinea pigs were not found to acquire any tolerance or increased resistance against atoxyl or sodium arsenite, after a long period of treatment with sub-toxic doses of the drugs.

—

Cows and Walnut Trees, by Gold, (Vet. Rec. 1911, Vol. 24, No. 1222, p. 356).—Three cows—two dry and laying off calving and having one or two feeds a day and a third a barren cow—were turned out into an orchard which contained apple, pear and chestnut trees, were found showing the following symptoms: dull appearance, blood-shot and twitching eyes, frothy saliva, hanging around mouth, champing jaws, grinding teeth at intervals and constipation. They urinated very sparingly. When made to rise they showed epileptiform symptoms.

The animals were known to have eaten some of the buds, leaves and nuts from the walnut tree and the condition described above was attributed to some poison which may exist in the parts of the tree eaten. Recovery was brought about in all cases by giving good strong purgatives of aloes and epsom salts followed by nux vomica, ammonia, etc.

—

Actinomycosis of the tongue by Dr. Seltenreich (Münch. Tierärztl. Wochnschr. 1912, Vol. 56, No. 11, pp. 218–219).—Twelve to fourteen cows out of a herd of 20 animals after receiving some green feed salivated excessively and later showed a disinclination to take any further fodder. On examining the tongues of the animals it was found that the mucous membranes were covered with abscesses and ulcerated patches. The lymph glands of the submaxillary space were enlarged.

After the administration of potassium iodide and changing the feed a complete recovery set in. As the cases quickly responded to the iodide of potassium treatment the author believed that he was dealing with actinomycosis.

—

Filterable viruses, by G. Vallilo, (Zeitschr. Infektionskrank. u. Hyg. d. Haustiere, 1912, Vol. 9, No. 6, pp. 433–479).—A review of practically all the important literature pertaining to the diseases caused by filterable viruses in man and animal. The topics of interest to veterinarians are the following: foot-and-mouth disease, peri-pneumonia, horse sickness, blue tongue in sheep, fowl cholera, rinderpest, sheep pox, contagious epithelioma in birds, agalactia contagiosa in sheep, and goats, hog cholera, swine fever, rabies, pernicious anemia in horses, canine distemper, stomatitis papulosa bovis specifica, and leukemia in fowls. A new disease in guinea pigs is also considered.

—

Thymol as a parasiticide in dogs, by S. H. Geiger, Jour. Trop. Vet. Science, 1911, Vol. VI, No. 3, pp. 296–300.)—The results show that thymol in the undissolved state is an efficient remedy for tape and round worms in dogs and produces no ill effects. The best purgative was found to be epsom salts, although castor oil and calomel can be used.

—

In regard to Steffens' method for combatting foot-and-mouth disease, by N. Meyer (Illus. Landw. Ztg., 1912, Vol 32, pp. 66–67.)—Comparatively good results were obtained with this method which consists of dusting yeast powder on the blebs and erosions in the buccal cavity and smearing yeast ointment on the foot lesions.

—

A new method for determining the presence of tuberculosis in animals, by E. Scharr and Opalka, (Berlin. Tierärztl. Wchnschr., 1911, Vol. 27, No. 46, pp. 833–840.—Amer. Jour. Vet. Med., Vol. VII, No. 5, pp. 156–166).—The internal wall of the trachea is swabbed with a small wad of cotton fastened on the end of a piece of thin wire. The swabbing is done through a canula which has been previously inserted into the trachea between the intertracheal rings. The swabbings are submitted to a bacteriological examination.

POINTED OPINIONS ON LIVE TOPICS by Readers of Veterinary Medicine

It is in reports like those of this department that the current history of the progress of veterinary science is written. Are you leaving a record of your experience which will help others, as you have been aided by these and other clinical reports? If not, you are earnestly invited to contribute from your experience that this department may be of the greatest service to its readers. By so doing you will earn the thanks of the editor, the approval of the veterinary profession and the lasting gratitude of those who are aided by your suggestions.

The Chicken Mites

By B. F. KAUPP, M. S., D. V. S., Fort Collins, Colorado

Laboratory of Pathology, Division Veterinary Medicine, Colorado Agricultural College

THERE are two kinds of chicken mites, first the common chigger scientifically known as the *Trombidium holosericeum*, and, second, a mite about the same size but with an ovipyriform shaped body instead of an oval one, as in the case of the first. There are also some other microscopic differences. This latter parasite is scientifically called the *Dermanyssus gallinae*.

There is always considerable trouble with the first named parasite during the summer months and it extends into the fall. Hot dry weather is most favorable for their multiplication and development. Many birds (principally hens) infested by chiggers, have been brought to this laboratory during the season. The statement from these poultry people invariably is that the birds die suddenly, and, when opened, all organs appeared normal, at least as far as they could tell. Those examined in the laboratory have proven the same. Further examination reveals the fact that the cracks and crevices of the poultry houses, as well as the cracks and crevices of the roosts and the nests, were literally alive with these little pests, which are about the size of a pin head. When full of blood they appear somewhat blue or red in color.

These chiggers are blood suckers. Their piercing apparatus is cone shaped, and with this they wound the skin and suck the blood. Imagine 500 to 1,000 (as we have found them) of these industrious little fellows on a single bird, and the irritation they are capable of producing, and you will readily understand why these birds die. The irritation which each mite produces at the point of puncture is considerable.

The birds often die suddenly without many visible symptoms.

The parasite lays its eggs in cracks and crevices, and in the filth of the hen-house, where they hatch into asexual, six-legged mites. Later they moult and develop into the eight-legged mature parasites.

To rid birds and premises of these mites it is necessary to thoroughly clean the building, including nests; repeat this every two or three days, if not every day. Spray with a two-percent solution (in water) of kreso, creolin or zenoleum, forcing the solution into the cracks and crevices. Repeat this disinfection twice a week. Pour coal oil on the roosts twice a week. Place one inch of air-slaked lime in the bottom of the nests before refilling them with clean fresh straw. Place in the dusting wallows a small quantity of tobacco dust, sulphur and pyrethrum (insect powder). Dust the hens with the same if found necessary, or dip them in a five percent solution (aqueous) of kreso dip, creolin or zenoleum.

AN EXTREME CASE OF HYDROCEPHALUS

The illustration is of a calf affected with hydrocephalus. It was taken from a four-year-old jersey which had gone full time. The head measured 49 inches in circumference. The ears, lower jaw and eyes were perfectly formed, while the upper jaw was badly twisted, and the teeth resembled a dog's.

The fore-limbs were short and could not be moved from the position shown in the illustration. The hind limbs resembled a dog's more than a calf's. They were also twisted. The vulva was several times larger than normal. The udder had only two teats on it, while just above the mouth were two more. Between the eye and ear a fold of skin about the size of a finger hung down. The cow is alive and doing well.

Doctor Maitland's case of hydrocephalus

E. P. MAITLAND, M.D.C.

La Plata, Mo.

EVACUATES THREE GALLONS OF PUS

I was called to a case four weeks ago, found the horse to be very uneasy, with his head turned to the flank, temperature 104° F., respiration thirty-six, pulse seventy, and weak. Upon leading the horse it was noticed that there was some difficulty in extending the left hind leg, and upon palpation it was found to be tender but showed no enlargement. A rectal examination was made and a large tumor-like growth discovered on the inside in the region of the flank it was firm and seemingly a tumor.

The history of the case revealed that at different times the horse had attacks of colic but seemed to recover with their common colic remedies. These colicky pains would occur only when the horse was worked hard and they lasted about two hours.

TREATMENT.—I used a small exploring trocar inserted it with care a distance of six inches and got a light flow of pus. This was proof that there was a deep abscess, and an incision was made from the outside about three inches long, this extended to the abscess and about *twelve quarts* of necrotic pus ran from the wound. The wound was then washed thoroughly with physiological salt solution, and packed with a strong solution of formalin and left for twenty-four hours. The packing was then removed and the wound painted with tincture of iodine and bacterins given.

Instructions were given to clean the wound once daily by free irrigation with physiological salt solution and to paint the inside every two days with tincture of iodine. The horse was greatly relieved by this treatment. He received bacterins every five days. And but little pus formed in the wound. He made a complete recovery in three weeks and is now at hard work.

S. E. NELSON, D.V.S.

Richmond, Utah.

ASCARIS MEGALOCEPHALA

I was called to see a fine four-year-old gelding and informed over the telephone that animal was down, in great pain and unable to rise. On my arrival I obtained the following history:

The colt had suffered at times during past few months from diarrhea. He had been running to a straw stack most of the

winter and was also fed regularly on corn and oats. About an hour after eating his corn on this occasion his sickness was noticed.

Clinical symptoms, pulse weak and rapid, extremities cold, ears cold, labored breathing, nausea, sweating, struggling, inability to rise and a temperature of 101° F.

I knew that I did not know what the trouble was so asked for consultation but was denied, so gave a prognosis of death shortly.

Treatment empirical, arecoline hydrobromide, hypodermically, tincture of capsicum in capsules, and whisky with warm covering. I stayed with patient two hours, he was getting worse rapidly, his struggles became more desperate and his respirations more labored showing it was only a question of hours until death would ensue.

I was called back to town and had to leave the patient, much to my regret. However, I told the owner to call me up when the animal died and that I would go out and hold an autopsy. He reported an hour later that the animal was dead.

Postmortem findings: Stomach normal, partly filled with food and containing some bots. The duodenum was badly inflamed and contained no chyme. There were over fifty of the ascaris megalocephala twisted and doubled into all shapes in the lumen of the duodenum the lining of membrane which was much congested and extremely red. There was also a quite extensive and severe inflammation of the visceral peritoneum in this region. Postmortem diagnosis, inflammation of the small intestine and peritoneum caused by the ascaris megalocephala.

R. A. DEAN.

Shakopie, Minn.

RAPID EMACIATION

I should like a prescription for a mare described as follows:

December 11, 1911, black mare, seven years old, weighing about 1,500 pounds, in good condition; owned by the Champion Mills; working every day; well fed and well cared for.

December 12, 1912, temperature 103° F.; a very foul-smelling, watery bowel discharge which responded to mild doses of calomel, aconite, digitalin and acetanilid. The mare lost flesh so fast and to such an extent, that it seemed impossible for her to recover. With all the known tonics and near-tonics and feed, and with the best of care, she is still alive; but the owner says, and with good reason: "I wish she did not look so sorry."

I am now giving mixed bacterins (Mulford's) and turning her out every day. She is the only sick horse in the barn. Can this be swamp fever? She has not had a recurrence of the fever.

IRA M. GREGG, V.S.

South Brownsville, Pa.

[Write to Dr. L. Van Es of the North Dakota Experiment Station, Fargo, North Dakota, for Bulletin No. 94, which gives the latest information obtainable on swamp fever.—ED.]

DIFFICULT PARTURITION IN THE SOW

When I am called to a case of obstetrics in the sow and find the patient so small that the pelvis will only permit the passage of one or two fingers, I at once fill the vagina and uterus to overflowing with boiled normal salt solution. Give a small dose of ergot, and I seldom fail to soon see some pigs, and I am not often told that the farmer got one with a wire hook after I left.

LOUIS CHAPMAN, D.V.S.

Perrysburg, O.

RABIES WITH UNUSUAL SEQUEL

I was called, on January 4th, to attend a horse that was torn and bleeding, the owner could not account for the condition as there were no nails or chains that could have caused the injuries. The bulbous portion of the anus was all torn off, the sphincter ani practically all gone; common integument torn and ragged for eleven inches, the biceps rotator tibialis gouged out in two places to the depth of two and one-half inches and four and one-half inches wide.

I gave the necessary treatment and found upon questioning, that a pet watch-dog

(brindle bull-terrier), weighing about thirty pounds, and eight horses were all the animals kept in the stable. We found the dog upstairs in the hay, the owner calling him downstairs after attaching a piece of wire to his collar; the dog acted sluggish, his eyes appeared sleepy, nose dry and hot. He had been off feed for a few days and away from home for two days, something unusual for him. The only symptoms of rabies he showed was a peculiar bark or rather a howl when tied up for a few minutes.

I decided him rabid, destroyed him by injecting one grain of strychnine into pleural cavity. The head was sent to Brown University, where negri bodies were found in abundance.

Upon closer inspection two other horses were found to have been very slightly bitten, *Eagle* (a gray), standing next to the above, *Gimp* (a black), had prints of teeth on inside of thigh posteriorly, *Dan* (a black horse), two stalls away, was bitten on the anus very slightly. I believe that Dan and Eagle were bitten three or more days before Gimp. The owner decided to have Pasteur treatment applied, so sent a description of age, weight and disposition to the New York branch of the Pasteur Institute January 4th, received the vaccine the 9th and administered it according to the instructions, about 500 Cc. to each horse intravenously.

Gimp had to be relieved both by hand and by enemas and given one pint of linseed oil per day until the ninth. Since that time he has been very bright and the wound has healed rapidly. The other two horses, Eagle and Dan, were worked as usual up to January 19th, when I was called and found Eagle showing all the symptoms of meningitis, or paraplegia; respiration fast and labored, walk weak and unsteady. On raising his head he would go down behind. His pulse was 78 per minute; temperature, 103° F.; sweating and stamping both hind feet, penis protruding, had not passed either urine or feces. Never having seen rabies in the horse, I was skeptical and gave treatment for azoturia, with improvement for a few hours, when animal fell and was uneasy all night. Next morning, January 20th, he was so exhausted that I destroyed him and then tried to back Dan out of the stall, and found him showing same symptoms that Eagle had shown the day before. In a few hours he was also unable to rise, and I destroyed him. We examined the brain of Eagle, but found no negrides.

Gimp, at this writing, March 3rd, seems to be all right and is working almost steadily. The wound is nearly healed and his general condition extra good. Why should the one badly torn and mangled make a good recovery and the two slightly bitten succumb to the disease?

L. T. DUNN.

Providence, R. I.

A CASE OF RABIES IN A COW

I was called recently to a roan, seven-year-old, 800-pound cow, in fair milking condition, that the owner said "had been acting very queer." From the clinical symptoms shown I determined it to be a case of rabies, and upon request of the owner the animal was destroyed and the brain carefully removed and taken to the laboratory of the State Board of Health for a positive diagnosis. There, with the assistance of Doctor Turley, the pathologist, my diagnosis was confirmed by finding negri bodies in the brain.

The symptoms this animal showed and which led to the diagnosis of rabies were: Temperature, 103.4° F.; heart action very irregular; had refused feed for two days; saliva dribbling from the mouth, the lower jaw being somewhat dropped. The animal was very nervous and easily irritated; she would attack the corral and feed boxes and any animals that came near the inclosure. A rooster was thrown into the corral and she immediately attacked it and chased it from the inclosure. Likewise she charged at a cat and a dog and a horse which were taken near the inclosure.

The owner, prior to calling me, had attempted to examine the animal's mouth and fauces by the aid of a clevice, and in the attempt wounded his hand in two places. Upon the advice of Doctor Rucks the city superintendent of health, he im-

mediately began the Pasteur treatment, which he took for the next twenty-one days at the Pasteur Institute in Oklahoma City. At present, after finishing the treatment, he is at his daily work again, cured.

ARTHUR DEAN, B.S., D.V.S.
Guthrie, Okla.

AZOTURIA DURING PREGNANCY

I noticed a statement in VETERINARY MEDICINE that the writer had never seen a case of azoturia in a pregnant mare.

March 21, 1908, a farmer drove from his farm to our village, a distance of five miles, and tied his team to the rack. In a few minutes one of them was down and I was called at once. I had seen him come in and I know there was no sign of anything wrong then, but when I reached her she had as typical a case of azoturia as any I have seen in twelve years of practice. She was unable to use her hind legs; the gluteal muscles were very hard, the urine the typical dark color; there was a great deal of nervous excitement.

The owner was quite sure the mare was in foal, but I doubted it, as I had never seen or heard of azoturia in a pregnant mare. She lived three or four days, but was delirious most of the time the last thirty-six hours. On postmortem examination a colt of about six months' development was found. This is the only case of this kind I have ever seen in my experience.

A. W. BEVERAGE, D.V.S.
Olathe, Colo.

A CASE OF CRAMP

Subject.—Black draft mare, four years old.

History.—This mare had been running in the stalk-field on preceding day. The next day it was discovered that she was unable to raise her right hind foot from the ground. This was the third time within the past two years that she had been affected in the same manner. The condition passed off the first time upon being moved a few steps, while the second attack lasted two or three hours.

Examination.—Revealed a typical case of cramp of the hind leg, as it is described in veterinary literature.

Treatment.—Forced exercise, excitement, massage with hot applications and chloroform liniment; chloral, morphine sulphide, laxatives and profound chloroform anesthesia. Each and all of the above remedies failed to give any relief, and the case is now of over a week's standing.

Any information regarding the above case, and the proper method of treating it will be greatly appreciated.

L. C. BEAUMONT, M.D.C.
Britt, Ia.

A CASE OF MELANOSIS

Subject.—Gray mule, twelve years old, in good condition and apparently healthy.

History.—About four years ago a swelling was seen to appear a few inches above and to the inner side of the olecranon, between the extensor muscles of the forearm and chest.

This condition remained about the same and did not cause any trouble by way of producing lameness or otherwise, until a little more than a year ago, at which time the swelling began to increase in size until, when my attention was called to the case, it had become so extensive as to crowd the shoulder away from the chest wall, so that the entire leg stood at a marked angle from the body; at this time there was also a swelling of any considerable size in front, a little below and to the inside of the scapulo-humeral articulation, which indicated that the condition had extended through between the shoulder and chest-wall to that point.

I withheld my diagnosis, but decided upon an operation, as that seemed to me the only means of obtaining relief.

Treatment.—The mule was anesthetized. I then made an incision through the skin and subcutaneous tissue, over the point where the first swelling occurred, introduced a trocar and cannula to a depth of about two inches, removed the trocar and a small amount of black fluid escaped through the cannula. I then enlarged the opening and a large quantity of black, offensive, coagu-

lated material was liberated through the opening.

After packing the wound to arrest hemorrhage I informed the owner as to the nature of the case, and gave an unfavorable progress.

The patient was kept at the hospital for a few days and the wound irrigated with antiseptic solutions, during which time the discharge of melanin continued, but as the chances of recovery continued to look more unfavorable each day, the owner decided to take the patient home and treat it there as best he could.

L. C. BEAUMONT, M.D.C.

Britt, Ia.

THE OCCURRENCE OF TETANUS IN A WOUND

Up to the present time tetanus following operation has been put to the charge of the surgeon. The implication has been that he introduced the tetanus through suture, lotions, dressings, instruments, sponges, or from his own hands or those of his assistants—not a very comforting reflection for the surgeon. Why should this tetanus occur in spite of the utmost care on the part of the surgeon? I believe that the reason is explained by Sir David Semple's paper. An anaerobic area has been left—the *sine qua non* for the development of tetanus from tetanus spores. Sir David Semple has shown that the spores of tetanus are frequently shown in the human intestine. He has shown that when tetanus spores are injected into a given area of a guinea-pig and quinine injected into a different area of the same guinea-pig, tetanus bacilli are to be found in the anaerobic slough produced by the quinine and nowhere else, and that a control guinea-pig which has similarly received an equal number of spores, but has not received any quinine, is not affected by tetanus. How do the spores reach the anaerobic area in this case? I can only understand it by some of them traveling through the blood circuit and eventually becoming stranded in the area of dead anaerobic tissue, where they develop into toxin-producing tetanus bacilli.—HENRY SMITH, V.H.S., Lieutenant-Colonel, I.M.S., in *The Veterinary News*.

EXTRAUTERINE INFLUENCE

A client of mine owns several thoroughbred kerry cows. These animals are stabled in two rows facing each other, with a floor space between of about ten feet.

These cows are bred to a thoroughbred kerry bull. The owner also has a large white cow that was kept in same barn along with the kerrys.

What I am getting at is this, the kerry standing directly opposite the white cow dropped a black and white calf, while all the other kerry calves were black. The calves which this cow has produced before and since the removal of this white cow have been all black.

This happened about two years ago, and I have never been able to arrive at any satisfactory reason why this particular calf should be marked as above; unless it was the presence of the white cow standing opposite.

I would like to learn if others have seen such cases and their opinion as to their cause.

H. W. BOYD.

Nyack, N. Y.

HOW TO TREAT AFTERPAINS

I wish you would give some good articles on obstetrics. I would like to read a commendable article by some one who is competent to write on after-pains (so-called uterine colic). I have made a special study of this condition during twenty years in practice and have seen lots of it. While I do not deny that blood clots have something to do with it, yet, I believe air has more to do with it. The medical profession has given it study. I do not recall now a case I have had in primiparae unless it was when I have dilated the uterus to flush out or to get a partly retained placenta. As to treatment, I shall continue to use the one I am using now, successfully. Since the H-M-C has come out I am using it in the place of morphine.

HARRY CARLOCK, D.V.S.

Dadeville, Mo.

PECULIAR OBSTETRIC CASE

Some years ago I had occasion to visit a case, that I thought was quite unusual. On Monday about noon a man asked me to see his cow, and said that she had been laboring since Monday morning, trying to calf. I went to see her, and found protruding, one front leg and two hind legs. The one calf that had the front leg protruding, had the head turned upon its shoulder, and after removing this calf, alive and spry, I removed a second calf with a rear presentation, which fell apart, entrails and skin. The hair nearly all pealed during the delivery. What I cannot understand is, that one calf should live and do well, the other be decomposing in the same uterus at the same time.

H. J. Rowe, V.S.

Sandusky, O.

"IT WAS NOT A PEDUNCULATED TUMOR"

I note on page 105 of the March issue a question raised, as to the correctness of the diagnosis, in a case of "strangulation of the intestine by ovarian ligament," reported by me in the January issue.

The broad ligament also passed around the intestine with the ovary which Doctor Williams claims is impossible and indeed seems so, but nevertheless it is true.

Intestine strangulated by ovarian ligament

The ovary was probably twice as large as that of a young mare or one that has not been used for breeding purposes, the hypertrophied condition being due to pregnancy and previous impregnations. I have the specimen preserved in my office (illustration shown) and it has been inspected by perhaps twenty veterinarians who will indorse my statement.

About all the explanation I have to offer for the dropping of this ovary is that I have noticed a few cases, in autopsies on aged mares, especially those that have raised a number of colts, where the ovaries were hanging from two to four inches below their normal position and were hypertrophied.

This mare was twenty-two years old; the mother of twelve colts and was pregnant at this time.

The opposite ovary was hanging at least five inches below its proper location.

This specimen is preserved in my office, subject to inspection.

W. B. Robinson, D.V.M.

Mt. Sterling, Ky.

EXTRAUTERINE PREGNANCY

Believing it the duty of all practitioners to contribute to so worthy a publication as the American Journal of Veterinary Medicine, I contribute the following that to me was a very interesting case. It convinced me that, while some things we are taught in our colleges concerning the reproduction of the different species and the physiology of the organs of reproduction seem miraculous and almost beyond belief, still, they are true, and all one needs is experience in actual practice and sooner or later he will be brought face to face with these phenomena.

I was called to attend a cow during labor. The owner informed me labor had been in progress not over a half-hour before he called me and I was about one hour getting there. He also assured me he had made no efforts to remove the calf himself.

This was a Herford cow and her third calf. Protruding from the vulva was the abdominal viscera of the calf, the intestines hung down nearly to the hock and at the lips of the vulva the liver and the spleen protruded. On examination with my right hand just in front of the pubis, the median line of the abdomen was laid open from the sternum to the pubis. I pinched myself to determine if this was only a hallucina-

tion, or was I really up against a sure enough proposition. The next twenty or thirty minutes was devoted to trying to locate the position of the calf. It was the most bewildering half-hour of my one-year's experience in veterinary practice, and seemed drawn out to hours. All four feet and the head were together, the spine at the lumbar region was curved back on the dorsal and the calf lay on its left side.

I began removal by first entirely eviscerating the calf, then with a hook which I inserted into the lower jaw and attached to a rope, I inserted the repeller. While one assistant repelled the other pulled on the head, my right arm introduced assisting with the head and two fore feet. Without much further trouble the calf was removed and the placenta came with it. The calf, on examination after removal had many other deformities.

I entered again to make further explorations and feeling for the neck of the womb found it closed, but, forcing in my hand found the uterus normally contracted and hardly room for my clenched fist. I withdrew my hand, and feeling above found a large laceration in the anterior end of the vagina. Exploring further, my hand came in contact to the left with the rumen, to the right and below was a roughened surface about two feet square, the identity of which I could not determine. It felt much like a membrane from over two folds of the large bowel. I informed the owner and gave an unfavorable prognosis. The cow seemed in good spirits and when offered water drank freely. No medication was given or left for owner to give as animal seemed to be resting easily.

JAMES B. MCNAMON, D.V.S.

Lineville, Ia.

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[We cannot agree that this was a case of abdominal pregnancy, but believe the evidence conclusive that the fetus was developed within the uterus and that the rupture of the vagina occurred during the the forcible delivery. It will readily be seen that in abdominal pregnancy the fetus could not be expelled to this extent.

The monstrosity here described is an interesting one and of rather rare occurrence. One cannot fail to recognize it as a case of *schistocormus reflexus*, from the following description in Williams' *Veterinary Obstetrics*, pages 745 and 746.

SCHISTOCORMUS REFLEXUS

"Under certain conditions the amniotic fold contracts in such a manner that the spinal column is forced down through the abnormally wide vitelline duct, and the somatopleur of the embryo is reflected so that it is virtually everted. This anomaly occurs almost wholly in the cow, though a few cases have occurred in other ruminants. The viscera lie naked, in the absence of a fetal body cavity, while the other portions of the fetus constitute an irregular mass, presenting the pleuro-peritoneal membrane externally in the form of an inverted pouch, open at one end, through which all four limbs and the nose may more or less protrude. The four legs and the head and neck lie in an inextricable mass, as in a pouch of skin. The skin, with its coat of hair, constitutes the lining of the pouch, and lies in contact with the contained limbs and head and neck.

"The diagnosis of this anomaly depends upon the anatomical relations above mentioned. Usually the monster presents by its four feet and head, and consequently the operator at once comes in contact with several, or all four feet and the head. Following along the fetal extremities, the hand passes into a closely enveloping pouch, lined with hair. Examining more externally, the operator's hand passes over the fetal mass and comes in contact with the fetal viscera lying loose within the uterine cavity.

"If presenting by the reverse end, the operator should recognize the viscera lying free, and the exposed, bent spinal column and ribs, covered only by peritoneum.

"Usually the condition offers rather serious dystokia. In the cases observed by us, fetal death, putrefaction and emphysema preceded the symptoms of dystokia, so that upon our arrival the fetus has been found putrid.

"Forced extraction and embryotomy offer the chief suggestions in delivery. The conglomerate, irregular outline of the fetal

mass, with projecting ribs and other bones, renders forced extraction too dangerous in most cases. Unless the pelvis of the cow is very roomy and the fetal mass very small embryotomy is to be preferred.

"In performing embryotomy, the operator should have in mind the anatomical relations of the parts, and should first of all make a longitudinal incision through the skin pouch, so as to lay it freely open and render the limbs available for operation. He should then proceed to diminish the mass to a sufficient degree, preferably first by the subcutaneous amputation of the two anterior limbs, This may be followed by the amputation of one or both hind limbs or of the head, as circumstances may suggest, until the remaining portion may be extracted without serious difficulty or injury to the soft parts."

In the August, 1911, issue of VETERINARY MEDICINE, page 697, a report of a case of this kind is given, with the accompanying illustration, by Dr. L. J. Herring, Wilson, North Carolina. Dr. D. O. Knisely, Topeka, Kansas, also mentions a case of schistocormus reflexus, page 626 of VETERINARY MEDICINE for June, 1911. In Doctor Herring's case birth was affected unaided, but the cow died some days later from injuries caused by the bony parts of the fetus. In the description we find:

"The photograph shows the best possible view, lungs, heart and abdominal viscera all outside of the body. The head, hair, one front leg and one hind leg were on the inside. As can be seen there was one front leg and one hind leg protruding through an opening in the abdominal wall about where the umbilicus should be. The most reflexed portion of the spine was in the region of the thorax."

Dr. Herring's Case

Before leaving this subject I want to emphasize the imperative need for more study of obstetric problems. At this season of the year not a day passes that there is not one or more inquiries received at this office that can be answered by a reference to any standard text on veterinary obstetrics. Obstetrics is a definite and exceedingly important branch of veterinary science and should be studied as such. Although attempts have been made to teach it by lectures I regard, with pretty good evidence, a textbook as indispensable. No veterinarian should attempt to practice in a breeding district without having carefully read the work quoted above. One is not treating himself fairly if he neglects to avail himself of this veritable mine of information to say nothing of his service to his clients.—EDITOR.]

DIAPHRAGMATIC HERNIA IN A NEWBORN FOAL

A few mornings ago I received a 'phone call to come to the ranch of an old client, eight miles away, but as he had left word at a neighboring ranch to 'phone me and left without saying what the trouble was, so that I could only guess at what to take with me, and of course made a bad guess. When I got there I found a twenty-four-hour-old foal that was said to have been scouring badly that morning, and had also had a number of evacuations the previous day, but of normal consistency. Also that the animal had seemed strong and lively the day before, and had sucked quite often, but it had appeared to breathe much faster than normal.

The mare being a very heavy milker had had to be milked for two or three weeks before foaling and the owner thought the milk had disagreed with the colt. I found the colt down in an apparently dying condition, pulse imperceptible, heart slow and labored, respiration feeble, visible mucus membrane, slightly injected, no indications of internal hemorrhage; passages of soft feces oozing from the anus without straining or effort.

I told my client that this scouring was only a symptom of some serious trouble internally, but whatever the cause it was not the fault of the dam's milk. The colt was in no pain apparently but lay in a semi-

comatose condition. I proceeded to administer stimulants but without effect and it died in less than an hour.

An autopsy disclosed the following: On making an incision into the abdominal cavity on the median line the first organ that presented to view was the liver apparently much enlarged. The stomach also was distended by gas and contained a pint or more of fluid principally curdled milk. The mesentery and large intestines showed a slight inflammation.

On attempting to move the liver I found it attached to the diaphragm and a closer inspection disclosed two hernia openings in the right and left centers respectively, of the diaphragm and a portion of the liver had penetrated each into the thoracic cavity. The openings were of about the same size, nearly round and about an inch and a half in diameter, the edges completely cicatrized and on the left side the part of the liver in the pleural cavity was as large as a man's fist. On the right side the enclosed portion of the liver had formed a number of small lobes, but had not completely filled the opening on that side and through the latter the small intestines had found its way, and almost the whole of it was in the lung cavity. It was empty as the constriction had prevented the passing of the stomach contents. On the left side a portion of the liver had become incorporated into the walls of the diaphragm.

There were also some adhesions of the liver to the large intestines. The whole organ appeared to be at least one-third larger than normal.

Had the liver completely filled both openings in the diaphragm and prevented the escape of the intestine into the pleural cavity what would have been the result?

F. SEGSWORTH.

Lodi, Calif.

PLAN TO ATTEND THIS MEETING

The annual meeting of the Missouri Valley Veterinary Association will be held in Omaha, July 1 and 2. For particulars write the secretary, Dr. Hal. C. Simpson, Denison, Iowa.

EDITORIAL

Continued from page 248

FEDERAL MEAT INSPECTION A FRAUD CHARGES MRS. CRANE

Representative Hamilton of Michigan has introduced a bill in the House of Representatives to prohibit the interstate shipment of calves less than six weeks old, with a view to preventing the use of very young calves for food. Mr. Hamilton's bill has everything to commend it from a humanitarian standpoint and should become a law. The spectacle of young calves in transit forty-eight to ninety-six hours without food, because unable to eat that provided for them, and arriving at the stock yards too exhausted to stand is a piteous one, and should not be a part of our civilization.

However the unwarranted statements of Representative Hamilton in support of this measure is enough to "queer" it. He asserts that the flesh of immature calves is the cause of much disease in those who consume it and is entirely unfit for food and that the only way to prevent its use for food is to stop the interstate shipment of calves less than six weeks old. Apparently Mr. Hamilton does not know that one-half of the meat consumed in the United States is slaughtered by local butchers who would be in no way affected by the law.

As a matter of fact no one has been able to show that eating the flesh of calves of any age is deleterious to health. Before the present rigorous rules of inspection were enforced millions of pounds of the flesh of unborn calves were consumed annually as "boneless chicken" and "deviled turkey" and no ill effects were reported from its use.

SUPPORT THE ARMY VETERINARY BILL—NOW

(*Continued from page 248*)

efficiency in this service. *The Veterinary surgeons of this country are a body of highly trained and intelligent men who have made, and are making great strides towards progress in their profession and it is not reasonable*

to expect that the government can secure the best talent of the profession unless some fitting and substantial recognition is given it." This voices the sentiment of the House of Representatives where the success of the bill is practically settled.

The profession of the whole country is now actively engaged in driving the bill through the Senate. To this end the immediate and vigorous help of every member is needed. In order to win, we've got to work in great haste. Congress will close the end of this month. Write to one or both of your senators at Washington, calling for support of the Army Veterinary Bill, known as S. 5792. *Don't cease until they promise outright in their letters to support the bill.*

EXPERIMENT STATION PUBLICATIONS

(*Continued from page 244*)

"Milk delivered in the cities in the summer months frequently contains bacteria in such large numbers that it is not a safe food for children, especially for infants whose food consists entirely of milk. In many cities a special milk may be secured, but this is sometimes difficult and always involves additional expense. When it is impossible to obtain milk entirely free from suspicion it is advisable to pasteurize the milk, especially if it is to be consumed by small children. The pasteurization should be done in such a way that disease producing bacteria as well as those likely to produce intestinal disturbances are destroyed without at the same time injuring the flavor or the nutritive value of the milk. This may be accomplished at home by the use of a simple improvised outfit."

THE AIR-SAC MITE

A few days ago an interesting case was brought to this laboratory for diagnosis.

It was a chicken from a flock of sixty in which several had died and several others were sick with an unknown disease. The sick chickens had a partial loss of appetite becoming thin and emaciated. While trying to swallow they would crane their necks and hold their heads to one side. There was diarrhea and just before death the combs would turn black. They lived from two to three weeks after becoming sick.

Upon postmortem examination of the chicken brought to the laboratory, there was noted many small whitish-yellow specks, about half the size of a common pin head, over the surface of the abdominal air sacs. Under the microscope these specks were found to be the air sac mites (*Cytodites nudus*) which anatomically speaking closely resemble the scab parasite of cattle, horses and dogs. Their mouth parts instead of being arranged for biting are arranged for sucking up the serum, that exudes on the surface, due to the irritation.

These parasites in large numbers produce sufficient irritation to cause the above symptoms and death of the bird.

Many were found infesting the lungs and trachea and in this case no doubt contributed to the suffocation which finally ended the bird's life.

When they infest the lungs and trachea they are coughed out through the mouth, and thus contaminating the food and water, find their way into other birds. This is a very serious disease when once started among a flock. Owners should not sell birds that are infested because of danger of spreading the disease.

To rid the premises of the disease all birds should be disposed of, the premises disinfected with a five percent solution of carbolic acid and new birds should not be brought on the premises sooner than sixty days after thorough disinfection. These parasites live for some time outside of the body. The feeding of sulphur has been recommended, with the hope that its elimination will destroy the parasite, but has not yet been sufficiently tried to establish its value.

B. F. KAUPP, D. V. S.
Fort Collins, Colo.

DOCTOR BRENTON'S FAME SPREADING

Dr. S. Brenton's likeness occupies the frontispiece of the May issue of the *Veterinary Journal*, London, and that publication has this to say of him:

"One of the most popular and respected members of our professional colleagues in

America, and whom we hope to welcome in England at no distant date, is Doctor Brenton, of Detroit, Michigan, U. S. A.

"Born in Canada of English parents he spent his early years on a farm, from which he imbibed that love of animals which eventually made him become a veterinary surgeon.

"Graduating from the Ontario Veterinary College in 1880 he located in Michigan almost at once, and his name has become a household word wherever advice on the diseases of stock is needed.

"In 1883 the Michigan State Veterinary Medical Association was organized, and Doctor Brenton was one of the founders, being its first treasurer, and, in 1885, its president. This year, however, he is an exceptionally proud man, for the American Veterinary Medical Association, at the recent Toronto meeting, selected him their president, and in that capacity he holds the pendulum which very largely sways the destiny of the profession in America.

"The association is in good hands, for no one has a better reputation for level-headedness, and we are sure that the ship will give proof at the end of his year of office of having been handled well by its helmsman.

"One great wish of Doctor Brenton's is to bring about a closer relationship between the members of the profession in England and America, and at the forthcoming International Veterinary Congress, if not before, there will be an excellent opportunity for this rapprochement."

VETERINARIANS MUCH NEEDED

There has perhaps never been a time when the opportunities for veterinarians were better than they are in this country today. A decided change is taking place, however, in the qualifications required. A large number of the many requests that come to us for men to take up various lines of veterinary work state that the applicant must be a thoroughly educated and technically trained man.

This is most gratifying for it indicates with great clearness that the veterinarian belongs to a learned profession. The economic and sanitary significance of his service is being recognized more than ever before. The important and responsible positions in state and government live stock sanitary work are calling for men of the highest possible preparation. Breeders and animal owners generally are not so much concerned in the horseman as they are in securing the services of men with efficient technical knowledge of the diseases to be treated or to be prevented.

The care of the sick and injured is an important duty but the conservation of the health of the more than $180,000,000 worth of live stock in this state (New York) and of the more than $4,000,000,000 worth in the United States is a still greater task for the veterinarian of today.

The veterinary profession is to be congratulated that universities and states have awakened to their responsibility in preparing men for this important service.—V. A. MOORE, in *The Cornell Veterinarian*.

THE DOOMED HORSE CAB

The picturesque Berlin cabman, with his white enamel hat, his out-of-date vehicle, his aged horse, his exorbitant charges and his ungrateful manners,, is to disappear. The chief of police rules that the obsolete conveyance can no longer be allowed in the thoroughfares of the city after April 1st, next. Compensation ($150) is to be paid to each of the sixty licensed drivers who are affected, and application for permission to drive motor vehicles is to be favorably considered provided they are able to qualify.—*Evening News*.

A PROPRIETARY COLIC DRENCH

In the January issue of VETERINARY MEDICINE, page 28, Dr. Cox asks for a real good colic drench that a veterinarian can sell to the horse owner to use for colic cases.

I think the doctor will find the following formula perfectly satisfactory.

Fl. ex. physostigma	min. 20
Fl. ex. cannabis indica	oz. ½
Turpentine	oz. 1
Eucamphol	oz. 1
Linseed oil, q. s. ad	ozs. 8

Mix and give at one dose as a drench.

GLENN E. PARSHALL.

Ramona, Okla.

FAKE NOSTRUMS EXPOSED

In a recent address before a large audience in the Chicago public library, states "The Voice of the Retail Druggist," Dr. Bernard Fautus, professor of materia medica and therapeutics in the medical college of the University of Illinois, denounced as fakes and frauds a list of advertised patent medicines.

He told of the danger that lurks in certain patent tonics, headache cures and soothing syrups and read a partial list of victims of such nostrums within the last year.

He charged the large majority of the newspapers of this country with being partners of the patent medicine fakers, whose business he estimated as reaching a total of not less than $100,000,000 a year. Advertising, he said, was the life of the business. Without it the fakers would have to retire.

Continuing, Dr. Fautus said: "The business is such a fraud that even the name 'patent medicine' is spurious. The makers cannot patent their formulas. They are protected only by copyrighting the name which they advertise. The business is so big that I have tried to find out its use. I have been unprejudiced in determining if it is a good business.

"I have here a bottle of 'Murine.' It says on its label that it is a 'reliable relief for sore eyes.' The wrapper claims that it will 'cure scaly eyes and children's sore eyes'—everything but glass eyes.

"This 'marvelous remedy' is nothing more than a three percent solution of borax and water with a slight coloring of golden seal. It costs five cents a gallon to make it. It is sold at a price that yields a profit of about 2500 percent."

Dr. Fautus turned to a table which held a stock of patent medicines and picked up a bottle of Liquicide, the successor to Liquozone, whose nature was exposed by Collier's Weekly in 1906. He declared that its claim to being a germ destroyer was fraudulent and that it was 99 per cent water with a smell of burned sulphur dioxide.

The lecturer next paid his respects to "Dr. King's Golden Medical Discovery," which before the enactment of the Pure Food and Drugs Act was advertised as a "cure for consumption," but this claim has been left off the bottle for obvious reasons.

Dr. Fautus took up in turn Piso's Consumption Cure, under a new name, which he declared now contains hasheesh instead of morphine. Peruna, which he said was 18 percent alcohol; Lydia Pinkham's Compound, and Duffy's Malt Whiskey. Of the Duffy dope he said that of the three "clergymen" who endorse it, one is a horse racer, another runs a marriage bureau and the third is an itinerant preacher earning a precarious living.

Referring to the suggestion given with Lydia Pinkham's remedy to write to the old lady for advise, the speaker exhibited a photograph of the tombstone of Mrs. Pinkham, who died in 1883.

Dr. Fautus mentioned a dozen "cures" for the morphine habit which themselves contain the drug. He said that when a person takes one of these "cures" he loses his craving for the drug, but he finds that he cannot stop taking the "cure."

"Spermox," advertised as a remedy for surplus flesh and sold at fifty cents a box, he declared was nothing but epsom salts, and "Canthrox," recommended as a shampoo is only powdered soap.

Even Madame Yale was not spared. The doctor said she ought to blush every time she sees one of her advertisements for "blush powder" which is made of glycerin water and almond meal. Her "skin food" is 70 percent vaseline oil with a tincture of zinc oxide, all of it colored pink and perfumed. Her complexion bleach is a solution of borax.

Dr. Fautus said that the nostrum fakers put alcohol into their dope because it brings temporary relief. For a moment it makes the afflicted forget. Morphine stops a cough, but a cough has a purpose. It frees the bronchial tubes from offensive and poisonous matter. After the relief which follows taking a morphine cough remedy the cough is worse. The better the doctor the less morphine he uses.—*Physicians Drug News.*

QUERIES

Is the radical operation for poll evil a success?

In poll evil do you recommend the removal of a considerable portion of the ligamentum nuchae where involved in the disease process?

Is there an advantage in combining cantharides with biniodide of mercury in blistering agents?

What experience have you had with adrenalin hydrochlorid in the treatment of azoturia?

What is the formula of the "Mistura Argenta Compound?"

Could exposure to smoke cause pneumonia and death in a horse after four days with no intervening symptoms?

Is roaring in a horse hereditary? In case a stallion is cured by an operation is he still ineligible for license?

Is there any value in the application of a blister to the back in tetanus?

Why does lymphangitis usually affect the hind legs?

Why is it that the majority of horses attacked with azoturia are attacked in the hind quarters?

Is a purgative of any value in the treatment of a case of tetanus?

What is the best treatment for a dog recovering from distemper and developing fits?

What is the physiological action of eserine on horses suffering from pulmonary emphysema?

What is the formula for Visio?

Is it better to feed whole or crushed oats?

Are crushed oats easier to digest than whole oats?

Do crushed oats lessen the colic cases?

Do horses thrive better on crushed than on whole oats?

A Boston terrier about four years old, has for some months carried his head slightly toward the left. His left eye is a little blood-shot and he occasionally goes into a fit, running around in circles, always to the left, which ends in his falling over. In a few seconds he gets up apparently all right. What is it?

What is a curative treatment for developed cases of cerebrospinal meningitis or mold-poisoning in the horse?

KNOCKS AND MORE KNOCKS

If veterinary practice is ever to be lifted to any degree of professionalism there are some things to be done and many things not to be done. In looking over your valuable journal for March I am reminded of the "many things," spoken of. To be plain, I trust that no orders for "poetry" have been placed with the printer on the strength of that home-made appeal which is accompanying duns from Bangor, Iowa. Think of the first line: "Just stop and think in times gone past"! Now, imagine an intelligent man scanning such a line on his monthly statement! How *anyone* can "Think in times gone past" is not explained and need not be, so far as I care, for I shall continue to send sane bills to sane people, and the others have no work done in my line. I have never seen anything quite equaling these verses, unless it was a "poem" shoved on me by a one-armed hobo, and I am sure he would have been ashamed of his, had he not been drunk.

One other thing not to be done is to forget the fact that many men are careful only to swallow some statements with liberal quantities of salt—not the proverbial grain of salt, but a large and abundant plenty. Now, for instance, when I read that bursattee story, where the Doctor laughs at its simplicity and is ashamed to take the money, I ran for the salt trough, and today I feel like a piece of salt pork.

Still another article in the March journal suggests a "don't," but it may turn out later that the item should have appeared in the joke column. Yes, I'm quite certain it was intended to provoke mirth, and was originally sprung on the veterinarians of the State of Oklahoma while they were in a joking frame of mind last December. Our

friend the author goes into detail regarding his methods of amputating the penis of an hermaphrodite to make the animal understand it was not a stallion. Now, the testicles were in the abdominal cavity, and were left there, as they were not needed and were not in the way. That's the joke! All we have to do with ridglings, you know, is to announce to them that they are not stallions, and then, if necessary, amputate a portion of the penis! If any further restraint should be required we might, as in the case described, arrange for a vulva. But never remove the testicles; oh, never! They simply contribute to the growth of the animal after the external decorations have been made! (Excuse me while I order another sack of salt!)

In conclusion I wish to be serious long enough to thank Dr. L. A. Greiner for his sane and instructive letter on corns, and the journal is to be congratulated on having such a contributor. I personally enjoyed the acquaintance of Doctor Greiner years ago and am glad to meet him again, if only in print. The truth is, I was just about discouraged at being unable to find anyone that has not got the "gravel" idea in his head; and I am sorry to say that not only the teamsters and smiths are "gravel" advocates; but I know of two veterinarians in this section, both graduates and successful practitioners, who treat graveled horses – but whether they ever found the gravel or not I do not know, and would not believe they had if I heard so.

L. H. MATHERS, D.V.S.

Sebastopol, Cal.

AMONG THE HEATHEN

A whole lot of newspaper editors offer a field of much-needed missionary work in all manner of real education. The hope is vain that they may ever learn to *think*. In substantiation of the foregoing we submit:

EXHIBIT A.

PECULIAR TREATMENT

Practised Upon a Colt Suffering With Lockjaw

A peculiar yet effective method of treating lockjaw in animals was practiced recently upon a colt owned by Wm. H. Laird, south of Centre Hall. The colt, a two-year-old, had been castrated, and shortly afterward the animal became sick. A veterinary's treatment failed to afford it any relief and lockjaw developed.

Mr. Baird had fully determined to kill the colt to put it out of its misery, but he was prevailed upon by a neighbor who happened to come to the Baird barn to call up Dr. Philip Frank, the local veterinary surgeon, and give him a chance on the case. Mr. Baird acted on the suggestion. Dr. Frank found the colt lying in the stables, legs extended and stiff, jaws open and eyes set. As a last resort the sledge-hammer treatment was decided upon; the sledge-hammer treatment is this:

A plank was held over the forehead of the brute and this was struck a heavy blow with a hammer. There was immediate response to the treatment. The jaws were relaxed, and the muscles in the limbs relaxed. In less than an hour, the colt was on its feet after lying for several days, and began eating hay. For the first hours the eyes occasionally showed all "white," but later the muscles held the orbs in their natural position.

This treatment described was followed with medicine, and now, almost a month later, the colt is all right, and no ill effect of its sickness is noticeable, and all due to Dr. Frank's radical treatment.—Contributed by F. N. Nissley, Bellefonte, Pa.

EXHIBIT B:

A NATURAL HOSS DOCTOR

Dr. J. S. Fidler, the veterinary surgeon of Lansing was transacting business in the city yesterday. The Lansing horse doctor says his services have been in demand the past winter and this spring. Dr. Fiddler became a horse doctor by chance, rather than by any premeditated design to become a man of science [Don't overlook "a man of *science*"] "Forty years ago, said Dr. Fiddler to a reporter for *The Times* yesterday, "I lost a great many horses and paid out considerable money to horse doctors. I decided to do my own doctoring from then on, and purchased some books which I read. I was successful with my own stock and soon my neighbors began calling me to doctor their stock. I don't know much about this Latin talk, but I can come pretty near knowing what's the matter with a hoss." Dr. Fiddler said the only epidemic [Get this classic on epidemiology] he knew of was a shortage of feed.—*Leavenworth* (Kansas) *Times*.

A CASE OF SUPERFETATION

My uncle Wm. Pipkin, bred a mare to Bass Sappington's saddle stallion, desiring to raise a good saddle horse. After some days from this service the mare (as farmers say), came in again and so he took his mare to the stallion for another service. When he arrived at Sappington's barn he found the stallion in a great state of excitement; covered with sweat, in fact, as wet as if he had just come out of the river. While we were examining him the stallion made one fearful leap into the air and fell dead. We were unable to determine the cause of death.

As my uncle had come so far and was disappointed in obtaining the service desired, Mr. Sappington suggested that he breed the mare to his fine jack which was done and this service was sufficient to put her in foal. The following spring I stayed over night at uncle's and that night the mare foaled; and early next morning uncle called me to the barn to show me a "great sight" and it was that the mare had given birth to twin colts; one was a mare mule, the other a horse colt, that very greatly resembled its sire (the Sappington stallion). The mare raised them both. They were perfectly formed and the horse colt made a very fine saddler. Although the mule colt did not quite come up to the high standard of "Ye Missouri Mule" yet it was a valuable animal. Isn't this double paternity?

CHARLES PIPKIN, M. D.

Kansas City, Mo.

ALUMNI MEETING OF THE U. S. COLLEGE OF VETERINARY SURGEONS

At the seventeenth annual meeting of the Alumni Association of The United States College of Veterinary Surgeons of Washington, D. C., April 13, 1912, the following officers were elected for the ensuing year: Dr. W. S. Pollard, '06, Baltimore, Md., president; Dr. R. W. Summers, Buffalo, N. Y., vice-president; and Dr. Charles M. Mansfield, '07, Washington, D. C., secretary and treasurer.

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W. B. SAUNDERS COMPANY, 925 Walnut St., Phila.

Dr. Adolph Eichhorn, senior bacteriologist of the Bureau of Animal Industry, gave an exceedingly interesting, illustrated talk on biological progress in the veterinary profession. This talk was very instructive and greatly appreciated.

Dr. Mann Page Smith demonstrated by operation the obliteration of the lateral ventricle of the larynx for the relief of roaring, using the Blattenburg burr. The animal was anesthetized by injections of chloral into the peritoneal cavity. The operation proper took four minutes.

A light buffet supper was served afterwards at which time many of the alumni renewed their acquaintances of student days.

The meeting was a most successful occasion, there being over seventy-five members present.

C. M. MANSFIELD,
Secretary.

VERMIFUGE FOR PUPPIES

Fl. ex. spigelia
Fl. ex. senna
Syr. arant comp.
Syr. glycerrhiza, *aa.* 1 dram.
M. Sig. Give one dram every other morning.

USEFUL COLIC DRENCHS

I notice in the January issue of your very interesting as well as instructive little journal, that Dr. W. B. Cox, of Unity, Sask., Can., would like to know of a really good colic drench, which he could put up and sell to the horse owner. Perhaps the Doctor could make use of one or more of the following:

Tincture opium.....1 ounce
Sulphuric ether.....1 ounce
Spirits of camphor.....4 drams
Essence of anise.....4 drams
Water, q. s.....1 pint

Mix and give in one dose. Repeat in one-half to three-quarters of an hour if necessary.

Fluid ext. cannabis indica.....1 ounce
Fluid ext. ginger.....4 drams
Fluid ext. nux vomica.....3 drams
Tincture capsicum.....1 dram

Mix and divide into three doses and give each in a pint of warm water. Repeat every half hour, if necessary.

Spirits of turpentine.....1 ounce
Raw linseed oil.....1 quart

Mix and give in one dose; if not relieved in an hour, give one of the following:

Fluid ext. cannabis indica.....½ ounce
Sulphuric ether..... 1 ounce
Water, q. s.....16 ounces

Mix and give at one dose.

Tincture of opium..... 1 ounce
Ether..... 1 ounce
Water.....16 ounces

Mix and give in one dose; repeat in three-quarters of an hour if necessary.

Tincture of opium.....1 to 2 ounces
Ether..... 1 ounce
Raw linseed oil.....16 ounces

Mix and give in one dose; repeat in an hour if necessary.

Aloes..... 1 ounce
Ammonium carbonate..... 1 ounce
Calomel.....30 grains
Water, or glycerine, q. s., to make a paste.

Mix and give in one dose.

Then give small doses of fluid extract of nux vomica in a little water every thirty minutes until relieved.

I have never put up stock prescriptions, as I have always believed that every case is a law unto itself, even in as common an affection as colic. However, I believe that it is far better for the stock man, as long as he is bound to give something, to administer a preparation compounded by his home-veterinarian; then if the remedy given does not have the desired effect, owing to incorrect diagnosis on the part of the owner, the veterinarian when called will know exactly what has been given and can prescribe accordingly. On the other hand if the owner has given a nostrum, the composition of which is known neither to the stock owner nor to the veterinarian, subsequent prescribing is very difficult, and attended by more or less risk.

In regard to the prescription department of your journal; it is of great importance to the veterinarian, as he thereby becomes familiar with the formulæ of the various proprietary preparations on the market.

In my vicinity, Kitchel's, Moxen's and Watkin's liniments, as well as Kendall's spavin cure, are used extensively. Not knowing their composition, I would be glad if some reader would give the formulæ in the next issue of the journal.

I consider the AMERICAN JOURNAL OF VETERINARY MEDICINE one of the best published, and I think it should be read by *every* veterinarian.

A. VON ROSENBERG, D.V.S.
Big Rapids, Mich.

LIKES THE FORMULAE

Enclosed find my renewal for VETERINARY MEDICINE for 1912. I think your publication of the formulæ of proprietaries is a good thing. No longer ago than yesterday one of my clients told me he is using a bottle of "Save the Horse" on a bone spavin. That bottle cost him five dollars. "Reducine" is also advertised here, but I do not know of any of it being used.

I have a case here that is hanging fire and I wish some one to help me out. I will describe symptoms:

This is a mare weighing about 1,000 pounds. She works on a farm and is driven some. She has had two or three colts and two years ago some three months after her colt was weaned her udder swelled on the left side, was very painful and sensitive to the touch, but did not suppurate, and I did not open it. Then a rash came on her tail and the hair fell out about a foot from the end and is still bare; also sores about the size of a penny came on her neck, along her mane, and also along belly. These sores will discharge a little serum, and for some time then she is some better. I have tried n ıly everything I thought indicated, but all has fa d. I used lotions and ointments on the ulcers and internally gave calcium sulphide, potassium iodide, Fowler's solution and polybacterins, but all seemed to fail. I don't think it is eczema, as there is no itch in connection with it.

I shall be much obliged for suggestions.

F. J. HAMMELL, V.S.
Tottenham, Ont.

The May journal at hand and it is a dandy. Keep up the good work.

C. H. INHOLZ, D.V.M.
Benton Harbor, Mich.

Veterinary Medicine a Leader

In a recent catalog of Saunders' Books the following is displayed on the third cover page:

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The expansion of our advertising has always gone hand in hand with the expansion of our business, both at home and abroad. In 1905 we advertised in 10 journals; in 1906 and 1907, in 11 journals; in 1908, in 13 journals; in 1909, in 16 journals; in 1910, in 17 journals; and in 1911 and 1912, in 19 journals; so that the Saunders announcements now have an annual circulation of well over 5,000,000, or nearly *100,000 every week* in the year.

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LARYNGITIS

This disease, which usually results from exposure to dampness or severe dry cold, is a most common one among horses and dogs, and in no small percentage of cases it is sufficient to cause death.

In the first or acute stages there is always considerable congestion, followed by inflammation of the mucous lining of the bronchial tubes. The animal experiences much pain and coughs frequently. There is usually a harsh sound to the breathing and a fever of high degree.

Pain attending the act of breathing tends to make the animal more or less nervous, and there is a consequent loss of strength. The appetite may also be lost either wholly or in part.

If the animal is immediately placed upon Glyco-Heroin (Smith) and comfortably quartered, relief will soon follow and the attack brought to an abrupt end.

When the disease has advanced to the second stage, the secretion from the bronchial mucous membrane becomes viscid, ropy and profuse—so much so, in fact, that breathing is made exceedingly difficult and painful, and the animal experiences excessive loss of strength and flesh.

In both acute and chronic bronchitis, Glyco-Heroin (Smith) produces miraculous results. The animal is relieved of cough, fever, difficult breathing, and nervousness; his sleep is made healthful, strength is preserved and appetite restored. Meanwhile the inflammation of the breathing-passages is subdued and healing of the affected parts begins.

Instances of the use of Glyco-Heroin (Smith) in cases of this disease are cited in proof of its wonderful curative properties.

CLINICAL REPORTS

By Geo. W. Meyer, D. V. S., New York City:

Grey gelding, ten years old, large draught horse, acute laryngitis, temperature 106° F., very much distressed, could swallow very little water, most of it returning through the nostrils; diagnosis, acute laryngitis.

Treatment: Glyco-Heroin (Smith) one ounce every two hours. Next day not much improved, temperature 105.6° F., appetite none whatever. Gave two ounces Glyco-Heroin (Smith) every two hours with better results. The nasal discharge was increased, large amount of phlegm falling to bottom of pail when attempts were made at drinking. Following day slight improvement in appetite; temperature 102° F. His cough was decidedly improved and he had eaten two quarts of feed at a meal.

The dose was now reduced to one ounce, every two hours and at the end of three days temperature was 100° F. Appetite good, the discharge from nostrils very slight, general appearance very bright with only an occasional cough. On second following day was put in for half day's work. After a week had past no more cough was heard and horse is as well as ever.

By R. E. Walters, D. V. S., Gravesend, Long Island:

Chestnut gelding, four years old. Laryngitis with a temperature of 103° F. Sore throat and cough. I prescribed Glyco-Heroin (Smith) in doses of one ounce, every four hours and applied liniment to the throat. This treatment was continued for three days when all the symptoms disappeared completely.

Glyco-Heroin (Smith) is a heavy liquid of most agreeable flavor. Having glycerin for its base, the preparation will keep indefinitely in any climate and is incapable of causing the fermentative disturbances which frequently arise from the use of syrupy products.

Dose for Horses is from one to two ounces every hour or two. If the cough is excessive, two ounces should be given every hour during the first twelve hours, after which the dose may be reduced.

Dose for dogs is from ten drops to half a teaspoonful. Large dogs may be given as much as one teaspoonful.

It is preferable that the remedy be given without any dilution. Veterinarians advise that Glyco-Heroin (Smith), like all other liquid preparations, be administered through a syringe. This instrument obviates the necessity of elevating the head of the animal to discomforting limits. However, Glyco-Heroin (Smith) can be given with equally good results from a bottle, or by being placed upon the tongue.

Like all preparations possessing great value, Glyco-Heroin (Smith) has been extensively but unsuccessfully imitated. To guard against imposition and disappointing results, the remedy should be purchased and prescribed in original packages only.

YOUR attractive and instructive journal (May issue) is certainly a winner.

A. T. PETERS.

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A CONFIRMED CHICKEN EATER

I was called to see a mule that the owner thought might have glanders and found the following:

Mare mule, eight years old; ordinary condition; temperature normal; respiration normal; pulse fifty-four full, conjunctiva somewhat injected and slightly icteric. Mucous membrane of nostrils normal in color, no discharge and no ulcerations visible; bowels somewhat constipated; kidneys acting about normally but the urine was highly colored; partial anorexia; ate very little. The skin was a solid mass of vesicular eruptions which had broken down and were discharging a viscid sticky substance that formed dirty brown crusts over the surface of the eruptions. There was a yellowish deposit around and under the crusts, very much like sublimed sulphur. The hair was all matted together in these crusts or scabs. The eruptions ranged in size from the size of a dime to the size of a half-dollar and were equally distributed over the body, legs, ears, and tail. Where the hair had been rubbed off short by the harness the eruptions were confluent and small blisters had formed and a straw-colored serum was oozing out, which also left a yellowish deposit on the skin. All four legs were swollen somewhat and patient moved off not unlike a horse with a mild attack of laminitis in all four feet.

History: This mule had been raised by its present owner, in Mississippi. Glanders was somewhat prevalent in this section of the state four or five years ago; but don't know whether it was found in this immediate locality. This mule had been fed on good sound corn and crab grass hay and some fodder and had been working regularly on the farm up to this attack which appeared suddenly with this eruption of the skin.

I asked the owner if the mule had had a chance to get hold of anything he did not feed her and he said yes, she was the worst chicken eater he ever saw and had caught and ate one the night before this attack came on and had eaten three or four in the past week. She had been eating chickens all her life. I then asked him if she had ever eaten that many in so short a time before and he said no. She had eaten only two or three in the past two months up to the past week.

Treatment: Gave aloetic purge and also a drench of powdered gentian, ginger, bicarbonate soda and nux in a quart of warm water and left a treatment consisting of potassium nitrate, spirits of niter, ether and nux vomica, two doses of each. I saw the owner seven days later and he stated he thought the mule was worse.

The next day I drove out to see the patient, thinking possibly he might be mistaken and that possibly she might have glanders or that something else might have shown up that might be more diagnostic. On arriving, contrary to the owner's statement we found the patient much improved in general appearance. The eruptions were nearly all dried up and healed. A few new ones had broken out on the face and nose and had run up into the false nostril and had gummed up in thick gum like scales. The owner had washed the patient two days before with a mixture of mullein and oak bark boiled together in water. A large edematous swelling had arisen and extended from between the forelegs back underneath the sternum and abdomen. The swelling in the legs had subsided and mule did not move off nearly so stiffly as before. There was still no discharge from nostrils and no ulcerations visible. Submaxillary glands were somewhat smaller than normal but were not indurated. Pulse forty-five; respiration normal; bowels, normal; temperature, normal; kidneys acting freely but urine still highly colored. Patient slightly improved.

Treatment: Washed out nostrils with warm creolin solution, extracted pint of blood from jugular for an agglutination test. Blood stream was very dark at first but quickly changed to almost the color of arterial blood and looked very thin and watery. The agglutination test gave negative results.

I prescribed the same treatment as before. Saw owner four days later and he said patient seemed to be doing nicely. The eruptions were drying up fast, the swelling was subsiding, the patient was eating fairly well and there was not much stiffness in her gait. I have not heard from her since.

Summary: Is it not likely that this trouble originated from eating chickens (she devoured all but the feathers), and if so, would it not most likely affect the lymphatic system more than any other organs of the body, or perhaps, one of the last three chickens she ate had eaten something that might prove poisonous to the mule while harmless to the chicken. I shall be glad to hear from any of the readers of this journal or any one else who can offer any enlightenment or theory as to the cause of this affection or what it was.

E. HEINY, D.V.S.

Hattiesburg, Miss.

EIMER & AMEND

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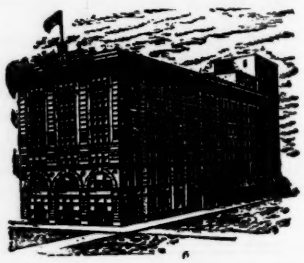

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